RAILROAD GAZETTE

FRIDAY, FEBRUARY 3.

Contributions.

Criticisms on the Proposed Forth Bridge.

TO THE EDITOR OF THE RAILROAD GAZETTE :

In your issue of Jan. 6, 1882, is an article with illustrations, from London *Engineering*, in reference to the proposed Forth Bridge.

After a recital of bridge construction among the savages showing the derivation of the principle, and after discussing the advantages and disadvantages of different systems of long-span bridges, it is made to appear that the peculiar design works out from the consideration of the following four conditions:

1. The maximum attainable amount of rigidity, both vertically and under a rolling load, and laterally from wind-pressure.

2. Facility of erection and security against hurricanes during all stages thereof.

3. That no untried material be used in its construction.

4. That the maximum economy be attained consistent with the fulfillment of the preceding conditions.

Though the preceding conditions hold good for the construction of the smallest as well as the largest bridge, a few might be added, as follows :

5. Provision should be made for the expansion and contraction of the metal from changes of temperature.

6. The bridge, being destined to last several centuries, it should be built to represent to posterity a masterpiece evolved from the most approved standards of modern bridge construction, and with a proper regard for architectural appearance.

A closer examination of the proposed design will show that it does not comply with all the stated conditions. To attain rigidity the suspension principle proposed by Sir Thomas Bouch was abandoned for the cantilever principle. It is, however, an erroneous notion that a suspension bridge cannot be made rigid. Most of the suspension bridges of older date had been built with a stiffening truss too low and too weak, and its proportions were guessed at. In consequence, they soon became shaky and undulating under loads. The office of the stiffening truss is now better understood, and its mathematical theory established, so that it is possible to build a suspension bridge as stiff and as rigid as a girder bridge.

If, for instance, in Sir Thomas Bouch's design, the height of the towers had been reduced from 550 ft. to 400 ft. their stability would have been greatly increased ; it is true the cables would have become a great deal heavier, so also the strains from temperature, but their rigidity would also have been greater. There could have been lateral bracing between the cables as well as between the trusses, giving great additional lateral rigidity. A height of 60 ft. for stiffening trusses as proposed would have been ample if made continuous, in which case there could have been expansion joints at both ends of the stiffening trusses. So modified, Sir Thomas Bouch's design would have made a very satisfactory bridge, rigid laterally and vertically, capable of erection by simple means.

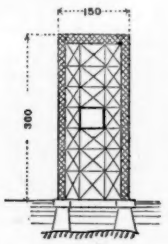
The material in the steel towers of his design was well disposed to facilitate erection (excepting the height), and in accordance with American practice as exemplified, for instance, in the piers of the Kentucky River bridge of Mr. Shaler Smith, or in the towers for the proposed Blackwell's Island bridge by the Delaware Bridge Company, or in the design for the same bridge by Colonel Flad, or in the towers of the Pittsburgh suspension bridge by Mr. Hemberle.

The architectural appearance of Sir Thomas Bouch's design, modified as suggested above, would have been grand and harmonious. So much cannot be said of the design proposed by Messrs. Fowler & Baker. The principle of the so-called cantilever truss is one well adapted for long spans, but apparently not very happily applied in the proposed Froth Bridge. To the uninitiated it must appear as a singular "mixtum compositum" of straight and curved lines, devoid of all architectural beauty. There is little doubt that condition No. 1 can be fulfilled also in this design. It is correct that the massing of strains into heavy, bulky members tends to reduce vibration from moving loads, but that it should therefore be necessary to go to the extreme with an unprecedented panel length of 100 ft. is by no means clear. It is stated that compression members will have the tube form 6 to 12 ft. in diameter to allow greater economy of material. To justify their use, Brunel's bridge over the Saltash is referred to. The construction of that bridge was a famous piece of bridge engineering at its time, but it is safe to say it would not be imitated by bridge engineers, at least in America, in this advanced age, because bridge construction has progressed since then, and better forms and means of disposition of material have been evolved. Imagine the Forth bridge steel tubes towering some 360 ft. into the air and some 12 ft. in diameter, without intermediate supports of any value. The compression in one of them can hardly be less than 5,500 tons, requiring a thickness of metal of about 2½ in., or $\frac{1}{24}$ of its diameter. Such columns would be composed of comparatively small plates, which will need to be spliced to the full value of their sections ; and not to speak of the difficulties of manufacture, the splicing alone would probably increase the theoretical weight by perhaps 20 to 30 per cent. ; there would be the everlasting anxiety for the security of a multiplicity of joints in a highly strained hollow tube, water getting in at the joints and doing its insidious work of rust and decay, where it would be difficult, if not impossible, to get at and stop it. What that means the Victoria and Brittania bridge tubes have proven by the costliness of maintenance. When they were built they were thought to be the most perfect girder type, theoretically and practically. But, alas, progress favors the open-frame types into which daylight can penetrate and men may critically examine and repair any defects.

The open-frame type proves to be the lighter, and cheaper too, both for bridge girders and for bridge towers.

How is it intended to erect columns wholly or piecemeal, 360 ft. high and slanting out from the base, is a matter of vast speculation. All other members of the cantilevers are shown to be ponderous and high in proportion, and it is not easy to see how they could be handled by simple means.

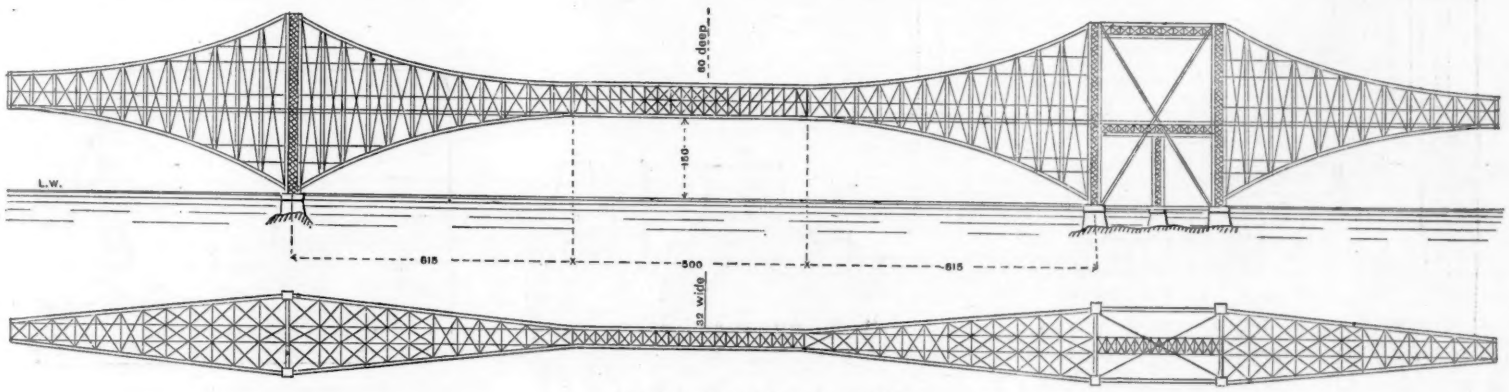
The cantilevers as proposed widen out at the base, and converge toward the top and the middle trusses, where their ends coincide with the end-posts of the middle trusses.



From this peculiar arrangement the members lie in the warped surface of a hyperbolic paraboloid, and it would be very difficult to make accurate fittings at the connections, and next to impossible to distribute the strains equally into the resisting metal masses. Any illusions on this point are apt to make the safety of the entire plan questionable.

To attach tension members to compression members of such vast and expanded forms in the expectation of evenly transmitting the forces is a very questionable experiment. The mastery of any bridge construction becomes manifest in the *disposition and arrangement of and for the connections and the facility of their manufacture*. But for this one secret of bridge engineering, the Tay bridge would stand to this day. It would appear that there is again a disregard or an insufficient comprehension of this most important part of a construction in the arrangement for the cantilevers. But grant they were built as proposed, we come to the erection of the 500-ft. middle spans for two tracks. The trusses appear to be about 40 ft. high at the ends and 60 ft. at the middle. The allusion to the celebrated Kentucky River and Minnehaha bridges of Mr. Shaler Smith implies that the erection of the middle spans is contemplated by building out from the ends to meet and close in the middle. If it is really the innocent intention of the English engineers to imitate the erection of those bridges, then they have chosen a bad form of truss. A few figures should have shown them this at once. The weight of one 500 ft. span built of steel could hardly be less than 1,600 tons, and if built with riveted connections, as per English practice, will not be less than 1,800 tons. But let us take the former weight; then the chord strain for 40 ft. height of end-posts would gradually grow up to $\frac{1600}{4} \times \frac{125}{40} = 1{,}250$ tons in either chord at the ends of one truss, requiring there metal vastly in excess of that needed in the finished structure. On the other hand should the height of 60 ft. be maintained for the whole length of the chord, strains from erection would of course be ⅓ less, or 830 tons, showing at once that a parallel chord truss would be more economical than trusses with curved top chords, which with curious simplicity are claimed to be so economical in this instance. If, however, the above mode of erection for the middle girders were not followed, only one other mode would be left, namely, building the 500 ft. spans complete at the shore, floating them into position and lifting them into place, which would require a simultaneous lifting power for at least 1,600 tons. While means could be devised to do this, they would be so very costly as to exclude them from consideration, not to speak of the danger to the structure from distortion or bruising during the operation.

To meet the strains from temperature in the proposed bridge, two ways are possible, either to provide an expansion joint at the point of contra-flexure in each span, or increase the metal sections throughout the structure to resist the contractions and expansion. The latter way would be impracticable and very expensive, besides the resulting strains defy mathematical investigation. The limits of change from temperature for the whole of the cantilever structure would be about 42 in., or 18 in. for one long span. Provision had then to be made for an expansion joint at one bearing of the 500 ft. spans; the other truss ends could be made rigid. This arrangement would deprive the structure as designed of a part of its lateral rigidity. To avoid this the towers could be placed further apart, say 150 ft. instead of 112 ft., in order to give a greater moment of resistance to the lateral strains at the towers.



DESIGN FOR FORTH BRIDGE.

In reference to the selection of material, condition No. 3, little is to be said. It would be well if the engineers would not commit the error of accepting standards for material in the sense of taking all for granted that has the approval of the Admiralty, Lloyds Underwriters, Board of Trade, or some other overawing authority. Common sense, unobscured by belief and faith, should most critically examine all points involving the strength of material, crude or manufactured into bridge parts, except those found true by confirming tests, and reject those found doubtful, no matter if supported by precedent. What mischief the worship of professional authority may cause was shown by that authoritative, "all-sufficient, ten pounds per square foot wind pressure" applied to the Tay bridge.

Considering the fourth condition, economy of construction, it is obvious from the foregoing that the proposed design will fall short also in that respect. It is so far away from successfully-tried plans and modes of construction that even a liberal estimate should have its sum total multiplied by an experimental coefficient of 2 to 3, to give a proper idea of its cost to those who have to furnish the money. There is even precedent for this in the Brooklyn bridge. It would then appear conclusively that the plan of Messrs. Fowler & Baker is of less merit as regards all the conditions stated above than the plan by Sir Thomas Bouch. We have experience and examples of the successful erection of long suspension bridges ; we have no experience of cantilever trusses composed of members of unprecedented bulk and weight. As far as logic can guide us, as far as foresight can reach, it points either to failure or extraordinary expense.

The architectural effect of the proposed structure is far from pleasing ; it does not represent one unique, harmonious conception, but rather a conglomerate of types of no relation of one to the other. Its confessed derivation from barbarian construction may, in an ethnical sense, explain the oddity of its appearance.

Having criticised a plan which must impress American bridge engineers as immature, it would perhaps be in order to suggest some modifications for improvement. Taking up, first, Sir Thomas Bouch's design, it has been suggested before how a few changes would have made it a very satisfactory bridge in every way. It is still doubtful, though, whether a stiffened suspension bridge presents any advantage in cost as compared with a well-designed cantilever bridge. Complete plans and estimates of both systems alone could settle this question in advance. The

DETAILS OF TANK LOCOMOTIVE—LONDON, BRIGHTON & SOUTH COAST RAILWAY.

Fig. 10.

Fig. 11.

Fig. 15

Fig. 16.

Fig. 18.

Fig. 17

Section A.B.

Fig. 26.

Fig. 27.

Fig. 12.

Fig. 13.

Fig. 6

Fig. 8

Fig. 7.

Fig. 9.

Fig. 23.

Fig. 24.

Fig. 25

Fig. 19.

Fig. 21.

Fig. 22.

Fig. 20.

design of Messrs. Fowler & Baker would be improved by having a parallel chord truss for the middle spans, and by having the top chord of the cantilever in a concave curve symmetrical to the convex curve of the bottom chord. The accompanying diagram will show the improved appearance of the bridge. The cantilever trusses should be in vertical planes instead of warped surfaces; the stability is the same, the workmanship and fittings very much simpler and cheaper. The panels would be shorter, the bridge members would be of lengths and weights easily handled. Compression members should be made of rectangular open sections to allow painting, examination and good attachments. There would be three planes of lateral bracing for the middle trusses, and six planes of lateral bracing in the cantilever trusses allowing very great lateral rigidity.

Other designs of course are possible, all of which would offer facility for manufacture and erection greater than the one proposed. It is probable that the distinguished engineers having the bridge to build will find out when working out the details on what an ocean of trouble, uncertainty and anxiety they will be launched with their strange design. Considering that English practice does not avail itself of the American pin connections, whose decided economy, accuracy of workmanship, facility for erection and absolute safety are so obstinately questioned by English conservatism—considering the inferior practices and modes of pin connections when really attempted, as shown in the late Tay bridge and other English bridges. Cousidering all this, the choice between the designs of Sir Thomas Bouch and Messrs. Fowler & Baker should favor the former one, with modifications, as the safer and the most probable of success. As maintained before, want of rigidity is no reason to decide against a suspension bridge. It would be a reproach and shame to modern bridge engineering if it could not make a suspension bridge as rigid as a cantilever bridge. The questions of *facility of manufacture, of erection and of economy* should alone be the deciding ones.

It can by no means yet be definitely asserted which is the better one, even if the most approved methods would be proposed for both. But where methods are proposed so foreign, if not contrary, to our experience of what constitutes a superior design, there the prediction would be justified that the proposed construction of Messrs. Fowler & Baker will be *experimental, very costly* and daring indeed, and inferior in that respect to the design of Sir. Thomas Bouch, for which there are existing at least analogies. It is to be hoped that the English engineers will seek council and avail themselves of the standards, experience and the construction of modern bridge-building, especially in America, where failures and successes both have taught bridge engineers valuable lessons. Indeed, Messrs. Fowler & Baker's task is a gigantic one; and the good will and wishes of all in their profession will be with them.

G. LINDENTHAL, Chief Engineer Monongahela Bridge.
PITTSBURGH, January, 1882.

Locomotives on the London, Brighton & South Coast Railway.

The engravings herewith of some of the details of these locomotives and the following description, for all of which we are indebted to *Engineering*, will complete our account of these interesting machines, the construction of which is well worth the study of American locomotive superintendents and master mechanics:

The class of small six-coupled tank engines now illustrated was designed for working the South London line at a time when the traffic on that section was extremely light, and did not pay working expenses. To meet the required conditions, Mr. Stroudley designed not only these small engines, but also a complete set of rolling stock, in which dead weight was kept down very effectively. Originally the trains were made up with eight carriages, seating 324 passengers. With the growth of the traffic, however, this number has increased to a maximum of 12, and an average of about 11 on this particular service. Owing, however, to the fact that some of these engines are employed in light branch traffic, the average number of carriages in the train hauled by them at the present time is 10. At the Paris Exhibition of 1878 one of these locomotives was shown, and was awarded a gold medal. At the present time there are 50 of these engines on the Brighton line, running upward of a million miles per annum, and this with trains stopping at stations on an average about three-quarters of a mile apart. Forty-four of these engines are employed in suburban traffic, and Mr. Stroudley informs us that from January, 1879, to July, 1881, these locomotives have averaged 49,563 train miles per engine, the average load being 10 vehicles, and the average consumption of fuel 24.23 lbs. per mile. This consumption is calculated on the actual booked train miles, no allowance being made for shunting or lighting up. The engines are found to come into the shops on an average once in two years, and to require the tires turning up once in 21 months, while since the first six engines were placed on the line in 1872 but one of them has had the tubes or fire-box renewed.

Referring to the illustrations which we published last week it will be seen that the engines above referred to have inside cylinders 13 in. in diameter with 20 in. stroke, and six-coupled wheels 3 ft. 11½ in. in diameter when the tyres are new. The tractive force is thus $\frac{13^2 \times 20}{47.5} = 71.15$ lbs. for each pound of effective pressure per square inch on the piston. The working pressure is 140 lbs. per square inch, and one of these engines has taken up a gradient of 1 in 100 a train consisting of 36 partly loaded wagons, the weight exclusive of the engine being over 200 tons. The wheel base is 12 ft.—the wheels being equally spaced—and the weight in working order is 24 tons 7 cwt.

The general construction of the boiler and arrangement of stays, etc., is clearly shown by our general views. It will be noticed that the water spaces around the fire-box are large, and that the fire-box itself has a top arched transversely and sloping longitudinally, this top being stayed directly to the shell by wrought-iron stay-bolts, as shown in figs. 1 and 4 published last week. These stay-bolts are screwed into place from the outside of the fire-box, and are riveted over at their outer ends. The fire-box plate is "set" at each stay-hole, so that the stay passes square through it, the head of the stay inside and the nut outside the fire-box plate, thus having a fair bed. The fire-box is of copper, and it will be noticed from fig. 4 that it is bulged laterally near the tube-plate to get more room for the tubes. In his later engines Mr. Stroudley has carried this bulging to a much greater extent than in the so-called "terrier" class which we are now describing, and the manner in which the fire-boxes are being constructed at the Brighton works is worthy of special notice. At first sight the form adopted may appear somewhat complicated; but it is a form which has several advantages, and it is one which can readily be carried out when the work to be done is understood. Mr. Stroudley adopts the plan of direct staying between the crown of the fire-box and the outer casing in all his engines, but in the larger sizes he makes provision in the two front rows of stays for the free upward expansion of the fire-box while the engine is getting up steam, while he also introduces cross-stays between the sides of the fire-box casing above the fire-box so as to counteract the tendency to distortion to which the system of direct staying gives rise.

The boiler of the engine we are describing contains 125 brass tubes 1¾ in. in diameter and 8 ft. 3¼ in. long, these tubes giving 470 square feet of external heating surface. The fire-box surface is 55 square feet, making the total surface 525 square feet. The area of fire-grate is 10 square feet; the sectional area through the tubes, disregarding ferrules, is 1.54 square feet, the least sectional area of the chimney 0.66 square feet, and the diameter of the blast nozzle 3⅛ in. The chief proportions of the boiler are as follows:

Ratio of fire-box surface to external tube surface	1: 8.54
Ratio of grate area to total heating surface	1:52.5
Ratio of sectional area through tubes to grate area	1: 6.49
Ratio of least sectional area of chimney to grate area	1:15

It will be noticed from our engravings—particularly the sectional plan, fig. 2—that the back and front plates of the fire-box casing are flanged to curves of unusually large radius, this being a feaure which Mr. Stroudley adopts in all his boilers. In the case of his larger boilers Mr. Stroudley now introduces an internal as well as an external angle-iron ring at the smoke-box end to unite the barrel with the smoke-box tubeplate, these angle-iron rings being turned and bored all over. All holes in Mr. Stroudley's boilers, whether for rivets or stays, are drilled, the drilling being done at the Brighton works by ordinary radial drilling machines. All fittings attached to the boilers are mounted on proper blocks riveted to the boiler shells, these blocks being faced and all joints (including the dome joints) being made metal to metal without the use of cement of any kind, the surfaces being merely smeared with oil. To enable this system to be more readily carried out, Mr. Stroudley uses everywhere very substantial flanges which do not spring sensibly. In the case of the dome the very thick flange required is obtained by making the base of the dome—or manhole ring—out of iron of special section 14 in. by 4½ in., this iron—the narrower flange of which is 2 in. thick—being formed into a ring, and then flanged out to fit the boiler. On one side of the flange this ring is welded to the external butt strip which covers the longitudinal joint of the barrel ring in which the dome is situated, this joint being placed at the top of the boiler. Of the regulator, which is placed in the dome, we shall speak hereafter.

The general arrangement of the frame with cross-stays, etc., of the engines we are describing is so clearly shown by our engravings published last week that it will be unnecessary to describe them in detal. We may point out, however, that the motion-plate is a steel casting having the valve-spindle guides cast in one with it. It will also be noticed that at the trailing end of the draw-bar is so arranged that the pull is taken on to a point immediately in the rear of the fire-box.

The axle-box guides are of cast iron and the axle-boxes of brass, the driving-axle having bearings 5¾ in. in diameter by 8 in. long, while the leading and trailing bearings are of the same length, but 5¼ in. in diameter. A section of the leading and trailing axle-boxes is given in fig. 23 of the present issue, while figs. 24 and 25 show sections of one of the driving axle-boxes. It will be noticed that all the boxes are lined with white metal, and that the bearings are carried down parallel for a short distance below the centre line of axle, so as to avoid any tendency of the journal to roll out of place under the influence of the push and pull of the connecting and coupling rods. In the case of the driving axle-boxes the bearing is cut away at the crown, so as to increase the upward wear and diminish the tendency to knock sideways. This, we believe, is a plan which was first adopted by Mr. Sinclair when Locomotive Superintendent of the Great Eastern Railway. We may mention here that in his larger engines Mr. Stroudley uses steel axle-boxes for his coupled axles.

In the engine now illustrated the crank axle is of steel and the crank pin bearings are 6¼ in. in diameter by 4 in. long. The wheels are forced on to their axles by hydraulic pressure amounting to 12 tons for every inch in diameter of the axles at the wheel seat. This is Mr. Stroudley's standard practice, no keys whatever being used. The rule as to the pressure necessary for forcing on the wheels is very strictly adhered to, and the wheels are never found to shift. The outside cranks have a throw of 8 in., and it will be noticed that they are placed in a line with the inside cranks instead of opposite to them, as is the usual practice. Mr. Stroudley has for many years in all cases adopted this mode of arranging the inside and outside cranks of his coupled engines, and although it involves the use of heavier balance weights the arrangement has advantages which far outweigh any inconvenience from this cause. With the inside and outside cranks arranged in line instead of opposite, the side thrust on the axle-boxes becomes the difference between, instead of the sum of, the strains on the inside and outside crank-pins, and hence the side wear of the axle-boxes, both in the bearings and on the guide surfaces, is most materially reduced. This avoidance of side wear in the axle-boxes by maintaining the axles at their proper centres, has also a material effect in reducing the wear of the coupling rod bearings, and one of the first goods engines which Mr. Stroudley placed on the line over 10 years ago has been running ever since without the bushes at the leading and trailing ends of the coupling rods ever having been renewed, while the bushes on the driving crank-pins have only been renewed once and scarcely show signs of wear.

We have on former occasions referred to the manner in which Mr. Stroudley saves room between the centres of the cylinders by splitting the exhaust and allowing half of it to pass downwards and around the cylinders. In the case of the small engines we are now describing, the moderate diameter of the cylinders rendered this plan less valuable than in larger engines, but Mr. Stroudley has nevertheless adopted it as shown by the transverse section, fig. 3, published in our last issue. It will be seen from this section that the arrangement gives a very free exhaust. It will also be noticed that in addition to the ordinary exhaust pipe leading to the exhaust nozzle, there is, in each side, a supplementary exhaust pipe, 3 in. in diameter, leading to the corresponding wing tank for feed-heating purposes. Mr. Stroudley has for some time adopted the plan of heating the feed by the exhaust in all his engines, whether tank engines or fitted with a tender, and with very successful results. The arrangement adopted is much the same in all cases, save that in the tender engines the exhaust for heating is taken off from the bottom of the exhaust passages and led along a suitable pipe to the tender. In some of his engines also Mr. Stroudley takes off branches from this exhaust pipe and delivers jets of exhaust steam on to the flanges of the leading wheels, an arrangement which is found to effect a partial lubrication of these flanges and thus reduce wear. In the engine now illustrated the supplementary exhaust pipes for feed heating are led into the tanks as shown by the dotted lines in figs. 1 and 4, so as to fill the upper part of the tanks with steam. The boiler is fed by pumps which are, under ordinary circumstances, kept continually going, the supply to the boiler being adjusted by opening more or less a by-pass cock, which allows a portion—or if necessary the whole—of the water delivered by the pumps to pass back into the tanks and be injected into the exhaust steam. The circulation thus kept up by the pumps causes the water to be very effectively heated throughout. Each tank is fitted with an overflow pipe, or air-pipe, which extends up to within an inch of the top, this pipe leading down to a small brass casting fixed in the side of the ash-pan as shown in fig. 4. This casting forms a separator, allowing any water discharged by the overflow pipe to flow into the ash-pan, while the small quantity of exhaust steam which continually escapes from these pipes is discharged outside.

In all Mr. Stroudley's engines the boiler feeding is performed by pumps only, and the pumps used have some special features. Thus Mr. Stroudley uses pump valves of very large diameter, with flat faces and very small lift, these valves having guide feathers placed spirally so that the valves partially revolve each time they are lifted from their seats. The stops against which the valves strike have also a large area, so that, practically, contact between them and the striking part of the valve is prevented by the water shut in between the two surfaces. The pump chambers are also arranged to form air vessels immediately adjoining the valves so as to reduce the shock on the latter, while small air-shifting valves are provided on the suction pipes.

We must now describe some of the details of the engines under notice, which are illustrated by engravings. Fig. 6 shows the piston, which is of the form adopted by Mr. Stroudley on all his engines. The body is of brass and is coned as shown so as to get the necessary strength with a light section, this body being $\frac{1}{16}$ in. less in diameter than the base of the cylinder, and being fitted with two cast-iron rings sprung into separate grooves as shown. The piston rod (fig. 7) is formed to a very steep cone where it fits into the piston so that the latter can be readily taken off the rod, it being necessary to do this when the piston has to be drawn. The piston rod has the jaws of the cross-head forged solid with it (see figs. 8 and 9), and the gland and stuffing-box bush are formed in halves to enable them to be placed on the rod. The cross-head blocks and guide bars are of cast iron, the latter being of L section, so that the two bars of each pair come together and form a ⊏ section, thus closing in the guide surfaces at the side and preventing access of dust. In the engines under notice the cross-head blocks are 10 in. long by 2¾ in. wide.

The connecting rods are shown in full detail by figs. 10, 11 and 12, which will require little explanntion. It may be pointed out, however, that the bolts for the large end are bored up for the greater part of their length so as to reduce their sectional area to that of the screwed portion, and thus secure equal elasticity. With these long bolts it is not found necessary to employ check nuts. Figs. 12 and 13 represent the coupling rods, which are fitted with solid brass bushes kept from turning round by taper pins, these pins being in their turn secured in place by set screws which press their larger ends.

The ends of the side rods are case-hardened, and the bushes are forced in by hydraulic pressure, the bushes being about $\frac{1}{32}$ in. slack on the pins, to allow for the play of the axles due to inequalities of the road. The crank-pins are of wrought iron thoroughly case-hardened and ground up to a true surface; these crank-pins prove exceedingly durable.

Figs. 15 to 18 above show the eccentric straps and rods. Mr. Stroudley was one of the early users of cast iron for eccentric straps, and he has for years past used no other kind. It will be seen from the views given that the eccentric straps are of such section as to be very rigid, while the two parts are united by very long bolts placed as close as possible to the sheave, the straps being extended outwards beyond the bolts, so as to secure a more rigid joint. In the case of his larger engines the eccentric strap bolts are bored up in the same manner as the connecting rod bolts; no lock nuts are used, but the single nuts employed are made very deep. The backward and forward gear eccentric sheaves for each rod of the engine are cast together, and are driven by lugs cast on them and shaped so as to clip on the arms of the cranks, no keys being used. This is an excellent mode of fixing eccentrics, securing accuracy of position, and saving all trouble of cutting keyways and fitting keys; Mr. Stroudley employs it on all his engines. As will be seen from fig. 1, published last week, the valve motion is of the lifting link type and is simple and direct in all its connections, while the wearing surfaces are all ample. The steam ports, we may mention, are 10 in. by 1⅛ in., while the exhaust ports are 1¾ in. wide; the valves have ⅛ in. lead, ¾ in. outside lap, and 3⅝ in. travel in full gear, while the travel of the eccentrics is 5⅝ in.

Figs. 19 to 22 show the regulator, this consisting of a brass butterfly valve of the form shown, working on a cast-iron face. In the case of his larger engines Mr. Stroudley provides a small pilot valve which opens before the main valve and relieves the pressure in the latter, but this is not needed in the small engines now under notice. Mr. Stroudley adopts a very moderate area of port opening for his regulators and he arranges the ports at a considerable distance from the centre of the face, so as to reduce the unequal wear of the inner and outer portions of the valve surface. The regulator rod, which carries the arms by which the regulator is worked, does not pass through the stuffing-box at the back of the fire-box casing, but is formed with a square end which enters a socket formed at the end of a short spindle which passes through the stuffing-box. This spindle has formed on it a conical collar which bears against a corresponding face formed at the inner end of the stuffing-box, thus making an almost steam-tight joint, and enabling the stuffing-box to be effective without being very tightly screwed up.

Figs. 26 and 27, annexed, show the arrangement for adjusting the load on the springs. The springs are all hung under the axle-boxes, and the upper parts of the spring links form nuts which are screwed on to the lower part, the arrangement being such that the length of the spring links cannot be altered without relieving the springs of their load.

The Westinghouse automatic brake is being applied to the whole of the passenger stock on the Brighton Railway, and in the engine we now illustrate its application is very neatly carried out. The Westinghouse air compressing pump is fixed outside the right-hand handrail plate, the exhaust steam from this pump passing into the overflow pipe of the adjoining tank. In Mr. Stroudley's tender engines, the Westinghouse pump is made to exhaust into the warming pipe, the exhaust steam thus passing into the tender and assisting to heat the feed. In the engines now illustrated

the position of the main air reservoir is shown by dotted lines in figs. 1 and 2, these views also showing the arrangement of the brake gear. The brake on the engine wheels is of course arranged so that it can be applied by hand independent of the Westinghouse apparatus.

The general fittings, arrangements for lubrication, etc., on the engine we are describing are very complete and are carried out with great neatness. They include, besides the ordinary fittings, one of Mr. Stroudley's speed indicators driven off the trailing axle. Mr. Stroudley applies these speed indicators to all his engines, and he is now fitting most of the latter with two duplex pressure gauges, each gauge having two index fingers. In the case of one gauge one of the index fingers shows the pressure in the boiler, while the second shows the pressure in the valve-chest. In the case of the second gauge one index shows the pressure in the main air reservoir and the second the pressure in the air pipes extending through the train. For applying the Westinghouse brake Mr. Stroudley is now employing a special form of drivers' brake-valve, which is worth notice, this valve being arranged to maintain, when in its normal position, a difference of pressure of 20 lbs. per square inch between the main reservoir and the brake pipes extending through the train. When the brake has to be taken off this excess of pressure is available for securing the prompt movement of the triple valves.

The Spuyten Duyvil Accident.

An Albany dispatch of Feb. 1 gives the following summary of the testimony of General Superintendent J. M. Toucey as to the accident at Spuyten Duyvil:

The special Senate committee appointed to investigate the causes which led to the railroad disaster at Spuyten Duyvil met this afternoon. Superintendent J. M. Toucey, of the New York Central & Hudson River Railroad, was examined. He said his jurisdiction extended from New York to Buffalo. All instructions given to employés were contained in the printed schedule, which he submitted, containing instructions to employés in the various departments. The road was divided into sections of 30 miles each, and 10 men were assigned to each section to see that the road was kept in good repair. The inspectors were on duty constantly. In dangerous localities the number of employés was increased.

In speaking about the recent collision, Mr. Toucey produced a map of the position of the cars Idlewild and Empire, and said that the pushing of the last car into the Empire was considered almost impossible since the adoption of the new platform. The company had under consideration a new method of exit other than the present plan of through doors only, which was a trap-door in the top of the car, which would only open at an angle of 45°. Doors at the sides could also be utilized in case of accidents. Mineral sperm, used in lighting the cars, was not as safe as candles, but was used on account of applications of passengers for better light than candles. If left to his own judgment he would use candles, but the public preferred good light for reading purposes. The road had experimented with gas, which resulted in the burning up of a car. The heating apparatus was arranged so that the fire could not escape from the stove, and was one of the safest that had been devised. The fire of the Idlewild was scattered through the Empire. Steam could not be used for heating, as on the elevated roads of New York, because it was impossible to get a sufficient supply of steam from the locomotive. Every known feasible system of heating had been fairly tested. Highly gilded and polished cars were more inflammable than ordinary finished ones. The public demanded such palace cars. He had investigated the accident, and the train had been at a stand-still 12 or 14 minutes before the collision occurred. The Tarrytown train could have been signaled from Spuyten Duyvil to Riverdale. The brakeman would have to go 600 ft. to meet a flagman, who could have signaled to the Spuyten Duyvil Station. A signal could be seen from the station 3,000 or 4,000 feet. Under the rules of the company a signalman would have to go half a mile to flag a train. Every trainman knew the rules of the company thoroughly. Five minutes headway was considered sufficient for an express train to lead a local train which made stops. He considered the block system at present impracticable. He said a perfect block system throughout the United States would be of benefit and prevent accidents. The Hudson River has a system.

"The safety of the entire train," he said, "depended upon the engineer. Improvements were constantly made on the road as they suggested themselves. It would have taken the conductor of the Spuyten Duyvil train two minutes to pass from the forward to the rear car." He thought that the conductor had sufficient time to give notice to the brakeman to flag the following train. He thought an engineer and fireman sufficient to run a locomotive. Two brakemen were on every train, one at each end. Employés are not examined as to their power of discrimination of colored lights. The firemen of each train assisted, when not otherwise engaged, in keeping a lookout with the engineer. When the Tarrytown train engineer was told at Spuyten Duyvil that the express was 12 or 14 minutes ahead, he probably was not in any manner prepared for the appearance of the light of the train ahead, and, therefore, was not to blame for the accident. The express train was about 600 feet away from the Tarrytown train before it was seen. It was possible to stop a train within that distance, but the engineer of the "local" went along in apparent perfect security, and was not prepared to stop his train so suddenly. There was a detective system, and a sufficient force of employés was engaged to run the road. The road had a system of a money deposit, but invariably the discharged employé took the matter into court and the jury usually decided against the company. The system was therefore abandoned. Employés were often suspended for slight misdemeanors. Palace car conductors were not under the immediate jurisdiction of the railroad company, but could be called upon by the conductor of the road in an emergency. If air valves were left open, it took at least 15 minutes to recharge the air cylinders. In case a wheel or axle should break, a passenger could instantly apply the air brakes by pulling the cord. Any passenger could use them in case of an accident.

The Lehigh Valley Employes' Relief Fund.

Tht following are the regulations of the relief fund established for the employés of the Lehigh Valley Railroad and its leased and controlled lines (the Pennsylvania & New York, the Geneva, Ithaca & Sayre and the Morris Canal) and jointly conducted by the companies and the employés:

First.—This relief fund is established and maintained by voluntary contributions from persons in the employ of either of these companies and from the companies themselves, for the benefit of those contributors in the employ of either company who may be injured by accidents occurring to them while in the discharge of their duty to the company, and for the families of those contributors who may lose their lives by such accidents.

Second.—Every person employed by either of the companies in any manner, may, if so disposed, at any time between the tenth day and the last day (both inclusive) of any month, contribute to the said fund the amount of one day's wages or less, but in no case is the amount contributed to the fund to exceed two dollars. The amount so contributed to be taken from the pay roll for that month. Each of the companies will, at all times, contribute to said fund an amount equal to the aggregate of that paid in by all the contributors in their employ.

Third.—Each class of persons employed by the company on each road, division or canal, such as engineers, firemen, conductors of each class of trains, baggage-masters, brakemen of each class of trains, track foremen, laborers of each kind, mechanics of each kind, etc., etc., may, after the first call made each year, elect one of their number to act as their representative, in connection with the Superintendent or Assistant Superintendent of that road or division, in managing and drawing money from the fund; such representative to hold his appointment until his successor is elected in the same manner. Should the office of representative become vacant at any time, it may be filled by a similar election. In case of vacancy in the office of representative, by reason of failure to elect on the part of any one or more of the classes of employés referred to or for other cause, the Superintendent of the road or division shall appoint as representative a person whom he shall consider suitable.

Fourth.—The money so raised shall be kept, without expense to the fund, by an officer of the Lehigh Valley Railroad Company, to be designated by the President of said company, and shall be subject at all times to the written orders drawn upon it, in accordance with these rules, jointly by the Superintendent or Assistant Superintendent of the road or division to which the entitled person is attached and the representative on that road or division of the class to which the entitled person belonged; such order to be countersigned by the General Superintendent or Assistant General Superintendent.

The Superintendent or Assistant Superintendent of the road or division and the representative together shall determine when such payment shall cease.

Fifth.—No money shall be paid out of the fund except upon such joint written orders of a Superintendent or Assistant Superintendent and of the proper representative, countersigned by the General Superintendent or Assistant General Superintendent as above stated, and no one shall be entitled to the benefit of the fund except, *First:* Employés of either of said companies, who shall have contributed to the fund on or subsequent to the last previous call and before the time of their accident, and who shall have been accidently injured while in the discharge of their duty to the company. *Second:* Widows or children of such contributors so injured or killed as specified in section sixth.

Sixth.—The money of the fund shall be appropriated and drawn out, as provided in sections fourth and fifth, for the benefit of those entitled to it, as follows, viz.: In case of a disabling accident of the kind mentioned in section first to a contributor not in arrears to the fund, he shall be allowed from the fund the same amount per day as that contributed by him to the fund, for every working day during his total disability to work, but not longer than for the period of six months. In case such accident results in the death of such contributor not in arrears to the fund, such death occurring at once or within six months from the time of accident, $50 shall be appropriated and paid from the fund for his funeral and other immediate expenses, and if he leaves a widow or a child or children under 16 years of age, an allowance of one-half the amount of his contribution, for every working day, shall be appropriated and paid to the widow monthly for the period of one year from the time of said contributor's decease, provided the said widow remains unmarried during that time; or, if there be no widow, then the said allowance of one-half the amount of his contribution, for every working day, shall be appropriated and paid to such minor child or children, jointly for the period of one year, or until the youngest attains the age of 16, if less than one year. In case such accident results in the loss of a limb which can be artificially replaced, appropriation and payment shall also be made from the fund for the purchase of a proper artificial limb.

To insure to subscribers these benefits from the fund, all cases of disabling injuries must be reported, immediately after the occurrence, to the conductor, foreman or other person in charge of the work, whose duty it shall be to investigate the case and report the same to his superior officer.

Seventh.—The payment on each call is to cover the risk of the contributor to such accident up to the time of the next call but no longer, and no such payment or payments will, in any case, be refunded to the contributor.

Eighth.—Whenever said fund shall, by its appropriation or use as above prescribed, become so much reduced as to need replenishing, the companies will call for another payment of the amount prescribed in article second. Each contributor shall then have the option to renew his contribution or not, as he may choose.

Ninth.—A list of the contributors to the fund, corrected after each call, shall be kept in the office of the person in charge of the fund, showing the date from which each contributor became entitled to its benefits.

Tenth.—The companies reserve the right to give notice of any change which they, the companies, desire to make in the plan; such notice to be given at the time of making any call, and the specified changes to take effect from and after the time when contributors become entitled to relief on said call; and the companies reserve the right to give notice at any time to the contributors that no further contributions will be called for. In case of such notice, no contributions will thereafter be received from either of the companies or any of their employés, and the companies will thereafter use the remaining balance of the fund for the purposes and in the manner herein set forth until all of the said money shall be so used, at which time the said benefits of the fund shall cease.

Eleventh.—As the companies contribute one-half of the entire fund so provided, and take upon themselves the trouble and expense of the management of the fund, they will not consider themselves bound to give any aid whatever to any person or to the family of any person in their employ who has refused or neglected to become a contributor to said fund.

Discrimination and Equal Terms in Massachusetts.

[From the Thirteenth Annual Report of the Massachusetts Railroad Commissioners.]

During the railroad year no complaint has been made of refusal of equal rates, or of any kind of discrimination, except in one case, where express trains were directed to be stopped at a flag station at the request of two parties only. Upon a suggestion that this was an error, orders were at once given that all persons should have the right to stop trains at this point.

A report made since the railroad year expired—*Selectmen of Weston* vs. *Fitchburg and Massachusetts Central Railroad companies* (Appendix E)—was founded on a petition in which discrimination was charged, but which really was a request for more reasonable fares. As it appears in that report, no law of this state requires an equal rate per mile for fares or freights. And it is fortunate that there is no such statute; for it would prevent the trying of an experiment which is of great interest, and which promises to be of great service. This is the scheme of very low suburban fares, equal for all stations within a certain distance from Boston, which has been inaugurated by the New York & New England Railroad. This company charges five cents for every passage to or from points not more than five miles from their Boston station. In this way, the benefits proposed by so-called "workingmen's trains" are secured in a more liberal and more convenient way. Such fares will, in some cases, render it economical as well as pleasant for passengers to go out at noon, and return after dining with their family. They apply, also, to all the members of a family, as well as to its head. The Fitchburg Railroad Company has made a somewhat similar arrangement, which was the cause of the complaint mentioned above; and other railroad companies are expected to follow.

It is gratifying to know that the experiment on the New York & New England road has been thus far completely successful. The returns for six months show an increase of receipts at the rate of 60 per cent. per year. This great increase accompanying a very large decrease of charges is a fair measure of the accommodation afforded. No complaint has been made, except that rents have risen in the favored district; and this sign of prosperity will not be regarded by land-holders as an unmitigated evil. It is hardly necessary to say that such a system of low fares would be impossible, if any rule of law or equity required that the reduction should be extended from one station to the next. In the case of the New York & New England road, it would compel a rate of one cent a mile up to the state line. Any question of the reduction of fares should be decided on its own merits, and not in connection with a special system, which applies to a well-populated district, whose people are all frequent travelers, and which is likely to become more densely populated under the operation of this system.

It seems proper to allude to a decision of the Supreme Court, which corrects a very general misapprehension as to the law of this state in regard to discrimination and inequality of rates. Since 1867 it has been believed by lawyers and railroad men, and by the public generally, that railroad companies were bound to give equal rates to all customers; *i. e.*, the same rate for the same service; having regard, of course, to the quantity of freight carried at one time. It has been supposed that a preference by which one dealer was favored above another, or above all others, was illegal. And the reason for the supposed legislation was held to be, that this was not only just, but on the whole that it was the best policy. And it was thought, that, although in some isolated case, it might seem advantageous for a railroad company to prefer some person or corporation in order to build up a great business, or to introduce a new one, yet it was deemed to be unsafe to intrust such a power to a corporation. It was considered as a stretch of legislation to delegate to a railroad company authority to create a monopoly such as might result from the exercise of such a power.

So generally did this idea prevail that in many states—indeed, in most except Massachusetts—this doctrine was held to be established by the common law, without the need of legislation.

In Massachusetts a different doctrine prevailed. And while the granting of *reasonable* rates was held to be the duty of all common carriers, including railroad companies, it was decided that such companies might give different rates to their customers, making them lower for some shippers than for others. This doctrine was laid down in the case of Fitchburg Railroad Company vs. Gage, 12 Gray, 393, which decided that "a railroad corporation is not obliged, as a common carrier, to transport goods and merchandise for all persons at the same rates." Justice Merrick says, in giving the opinion of the Court, "The defendants do not deny that the charge made on them for the transportation of their ice was according to the rates established by the directors, or assert that the compensation claimed is in any degree excessive or unreasonable. Certainly, then, the charges of the plaintiff should be considered legal as well as reasonable. Nor can the defendants have any real or equitable right to insist upon any abatement or deduction, because, for special reasons which are not known and cannot therefore be appreciated, allowances may have been conceded in particular instances, or in reference to a particular series of services to other parties" (p. 399). The reasoning of the Court will more fully appear from an extract hereafter given in a more recent decision.

The difference between this rule and that of other states will be seen by the following extracts from the opinions of two well-known jurists; and such extracts might be multiplied almost indefinitely:

"A toll is granted. But a toll implies uniformity of compensation for equality of service. It is for the sole benefit of the corporation, and not to enable the corporation to give discriminating advantages."—APPLETON, C. J., *New England Express Company* vs. *Maine Central Railroad Company*, 57 Maine, 188–196.

"No special privileges should be granted to one man, or set of men, and denied to others. The special stipulations inserted in charters, for the purpose of securing these rights, are placed there in abundance of caution, and affirm nothing more than the common right to equal justice which exists independent of such provisions. The supposed necessity for such provisions in charters granted in this country and in England proves nothing more than that the law-makers in both countries were aware of the difficulty in holding large corporations to those common obligations of justice which individuals feel bound to acknowledge without legislative enactment."—C. J. Twiss, 24 Penn. 378.

In 1867 an attempt was apparently made to change the law of Massachusetts, and make it conform to that of other states by passing chapter 339, requiring equal as well as reasonable terms, etc., for all persons and companies. But, as it now appears, by an unfortunate choice of language, the Legislature re-enacted the doctrines of Fitchburg Railroad Company vs. Gage, instead of repealing them.

In Spofford vs. Boston & Maine Railroad, 128 Mass. 326, the plaintiff, a student who had paid the regular price of a season ticket for three months showed that other students of like age had been allowed, at the discretion of the President, to buy such tickets at half price. And it was held that there was not a violation of law and that no action could be maintained. In giving the decision Justice Soule says:

"The provisions of Section 138 are re-enacted from the statute of 1867, Chapter 339, previously to which statute there was no legislative enactment of the sort. In the year 1859 it was decided by this Court, in Fitchburg Railroad vs. Gage, 12 Gray, 393, that the common law requires of carriers equal justice to all; that the equality which is to be observed in relation to the public and to every individual consists in the restricted right to charge, in each particular case of service, a reasonable compensation, and no more. If the carrier confines himself to this, no wrong can be done, and no cause afforded for complaint. If, '*for special reasons in isolated cases, the carrier sees fit to stipulate for the carriage of goods or merchandise of any class for a certain time, or in certain quan-*

tities, for less compensation than what is the usual, necessary and reasonable rate, he may undoubtedly do so without thereby entitling all other persons and parties to the same advantage and relief.' The Court, referring to the right of the corporation to establish rates of toll on passengers and merchandise, which, under the Revised Statutes, chapter 39, section 88, was substantially the same as it is under the existing statutes, said, 'This right, however, is very fully and reasonably subjected to legislative supervision and control—a provision which may be believed to be sufficient to guard the large conceded power against all injustice or abuse. And in view of this large and unqualified, and therefore adequate supervision, the right of railroad corporations to exact compensation for services rendered may be considered as conforming substantially to the rule of the common law.' The Statutes of 1867, chapter 339, re-enacted in the Statute of 1874, chapter 372, section 136, was passed after this Court had thus defined the meaning of the words 'equal justice' as applied to the dealings of carriers with their customers. The similar language, 'reasonable and equal terms,' used in the statute, is to be interpreted in the light of this definition, especially as it appears, from a comparison of different parts of the statute, that the words can not have been used in a strict literal sense."

This language is more worthy of remark, because, as the Judge says, the case might have been decided under the peculiar provisions of §135, excepting from the general provisions of the act certain trains to be designated to carry passengers at reduced rates. But the Court very naturally preferred to base the decision upon the general provisions of the statute.

It would seem clear, then, that the legal profession, and all others, have been in error in believing that uniformity of compensation for equality of service was the law of common carriers in Massachusetts, and that it is lawful for railroad managers, for reasons satisfactory to themselves, to give lower than ordinary rates to one shipper than to another. The law still requires that rate should be "reasonable;" but if any attempt were made to enforce it, the difference between the indefinite requirement of reasonableness and the fixed and definite rule of equality would make the exaction of penalties exceedingly difficult.

Whether it is desirable to change the law so as to absolutely require equal compensation for the service, or whether the fixing of freight and passenger rates can best be left, as other matters are, to the interest of the companies, influenced by public opinion, and subject to the inspection and public criticism of this board, is a question for the wisdom of the Legislature. It has seemed to be our duty to lay before it the decision by which the Supreme Court has corrected an almost universal misunderstanding of the law.

January Meeting of the Master Car-Builders' Association.

This meeting was held in the rooms on Liberty street, New York, on Thursday evening, Jan. 19, Mr. Leander Garey, the President of the Association, presiding. He announced that the subject for discussion was the "rules governing the condition of and repairs to freight cars for the interchange of traffic."

Mr. GAREY said: "Every master car-builder present and any man who has anything to do with the transportation of freight is well aware of the necessity for prompt inspection of and decision on the condition of cars at the terminal points. In fact, freight agents have stated that the inspectors at interchange points are really obstructionists, and that they often detain freight unnecessarily. In order to meet the requirements at such points, the rules which we are now working under have been framed and from time to time amended, and probably in the future it will be necessary to do so again to meet the necessities which arise. At this meeting it is designed to discuss the present working of the rules, to learn wherein they are not what they ought to be, and if possible to prepare for a revision of them at our next annual meeting, and I trust that each one will take hold of this subject with a will, and if there is any defect in the rules, which has been made apparent in their practice, and which ought to have special attention, th t they will present such defects this evening."

The Secretary then read the following letter from Mr. John Kirby, of the Lake Shore & Michigan Southern road:

LETTER FROM MR. KIRBY.

"I would ask the gentlemen present at the meeting to consider the question of not permitting the return of old trucks when the car-body has been destroyed. This company is receiving a large number of trucks from cars whose bodies have been destroyed on foreign roads. When the latter is the case the trucks are of little value. The destruction of Lake Shore & Michigan Southern cars on foreign roads this last year has flooded us with second-hand trucks. Some of the companies which have returned our trucks have repaired our cars with foreign castings. I would recommend that a rule be inserted at our next annual meeting implying that the destruction of the body of a freight train car means total destruction of the car."

The PRESIDENT said that if a road destroying a car-body having the trucks left in as good condition as when received upon the road and were deprived of the privilege of returning those trucks to the owners, who would be supposed to have a greater interest in their valuation than the party who would have them on its hands, not being of its pattern, it would leave upon its hands property of very little value, unless it were to be used under car-bodies owned by the same parties. He was unable to say what the experience of other parties had been, but it would appear that there should be more trucks destroyed than car-bodies. If such were the case, parties destroying car-bodies should retain the trucks and pay for the entire car, including trucks, and hold the trucks to be used under car-bodies owned by the same parties.

Mr. MARDEN, of the Fitchburg Railroad, had had quite a number of cars broken belonging to foreign roads; when his road had totally destroyed the bodies of the cars and, in some instances, somewhat damaged the trucks, it, with one or two exceptions, arranged to send the trucks home, and repaired them as far as we thought was necessary, so as to have them in as good a condition as they were when received. But in future when it is at all practicable for him to keep the trucks or any parts of them, and use them under cars that he might receive, he should do so in preference to sending them home. Still he could see some objections to adopting a rule which would oblige a road to keep the trucks and pay for them provided the body was destroyed, and the trucks were left in good condition. There are roads that seldom receive foreign cars from the same line. They might break up a lot of cars, and the trunks belonging to them would remain on their hands, perhaps, for years before they could get rid of them. If companies sent only their good cars away from home, there would be fewer breakages.

Mr. LENTZ, of the Lehigh Valley Railroad, thought that a rule compelling parties who break car-bodies to keep the trucks would be arbitrary and unjust. Certainly the owner of the car-body can use the trucks to a better advantage than the road can on which the body was broken. In the last year, if such a rule had been in force, the Lehigh Valley road would have had a large number of trucks of different kinds on its hands that perhaps there never would be an opportunity to use again.

Mr. ADAMS, of the Boston & Albany Railroad, said his company had not suffered from the fact that they had been compelled to take their trucks back; they were always willing to do so if delivered free of expense. He thought that in cases when the distance would be too great to warrant paying the freight home they should hold the trucks. He did not think it would be good policy to change the rule much.

Mr. MARDEN said this rule had given his company perhaps less trouble than any other. If he had a car destroyed on his road and the trucks were good and the freight was not too much, he should want to send them home, but whenever he could use the trucks or their parts to advantage he should prefer to keep them and settle for the car.

Mr. ADAMS did not understand why Mr. Kirby objected to receiving his own trucks. If they were worth using, he certainly was the one to do it. If they were not, who should tear them down if not himself? He apparently wanted somebody to take his old trucks and pay him full value for them.

The Secretary then read a letter from Mr. Henry B Stone, General Superintendent of the Chicago, Burlington & Quincy Railroad, asking that in connection with the subject under discussion the Association would have the following question discussed which was raised in a letter from Mr. West, Master Mechanic of the Iowa Division of his road:

QUESTION BY MR. WEST.

"When there are two good wheels on an axle, one loose and worn in the hub so that it would need reboring to make a good fit to stay tight on another axle, which would probably make it necessary to make the hole in the wheel larger than the standard, probably requiring a new axle with especially large wheel-seats to fill the hole, the question is, should not both wheels in such a case be treated as scrap, or should the road owning the car with said loose wheels pay for a new axle less the old to fit said wheels to allowing scrap for the old axle?"

The PRESIDENT said they were well aware that a loose wheel very seldom, if ever, can be fitted to the same axle. The rules prohibit prick punching, shimming or any device whatever except that of a hydraulic pressure sufficient to keep the wheel tight. The question seems to be whether both wheels, where one is loose upon the axle, should be charged as scrap, that is, paid for by the owner of the car, or if a new axle should be supplied and paid for less the scrap axle, that is, the axle on which the wheel was loose.

Mr. ADAMS did not think that in such a case the wheel would be a scrap wheel. They should pick out an axle with a larger wheel-seat and put that in, and he thought there should be the simple charge of two dollars for the change. If the wheel had been run so that it had worn the hole out unusually large, the parties running it ran a great risk. In such cases he went to his pile of second-hand axles and found one with a wheel-seat a little bit larger and fitted the axle into both wheels, taking out the old axle. If it was an axle that would do to fit again, he used it again for some other car of the same road. He did not mean to shim an axle, but he did not believe everybody else refrained from that, because he found them shimmed. He found one the other day with a sheet of tin all the way around it. He found a car on his road once with three different lengths of axles, and they varied an inch and a half. The party who repaired that car did not follow the rule. They might ask how did they fit it up. In those that were too long they cut the brass off on the inner end; in those that were too short they cut the brass off on the onter end, and they just fixed it until they got it off their line, and when they got it off their line they did not care and it got clean home, and he found the boxes just in that condition. There was only one of the original axles under; the others were all foreign axles of a different pattern and all of different lengths. He had made up his mind that everybody was not honest. He was trying to be honest, but he was making up his mind that it was not of much use.

Mr. MARDEN had had three or four cases of loose wheels on the Master Car-Builders' standard axle, which probably has the largest wheel-seat of any axle running. In such cases he took second-hand wheels that had been taken off of a smaller axle and put them on in place of the loose wheels, and let the latter go as scrap, charging two dollars for fitting the others. His road was the loser by the transaction, but he could see no other way out of the difficulty.

Mr. LENTZ, when he had a wheel that was loose, tried to get a new wheel to fit it up and put it on the same axle, and keep the old wheel until another axle came along that would fit. When both wheels were loose he fitted up a new axle and put them on, or when he had no axle to suit the last wheel be put in a new axle and forced off the other wheel, and put them both on the new axle and kept the old wheels. Shimming and prick punching were never allowed on the Lehigh Valley Railroad.

Mr. L. GAREY said the rule was very clear on that subject. It says two loose wheels fitted on second-hand axles or per pair $2.00. It would appear to be a very simple thing in case a loose wheel was found to pull the larger wheel off the axle and fit it with two second-hand wheels and let the car go. You then had two wheels in place of the two second-hand wheels sent away. A company having this loose wheel on its hands would lose nothing excepting the labor in excess of the two dollars charged.

Mr. LENTZ said that if loose wheels came off a standard axle and had room too large for the axle, they would be obliged to turn their new axle larger than 4⅛ in.

Mr. L. GAREY: A trifle larger; but you would not change the forging size of the axle.

Mr. ADAMS inferred from the letter which had been read that the parties who wrote it had an idea that they should make scrap of the loose wheels and charge the full price of $9 for a wheel; but he did not think that would be fair.

Mr. L. GAREY said it might be interesting to know how many roads were working under the present rules of interchange. He had a memorandum which showed that 46 roads owning 320,000 cars had adopted the rules and were working under them; 23 roads owning 53,000 cars were working under the rules but had not signified their adoption of them specially. That is, there were 373,000 cars represented as working under the present rules of interchange.

The Secretary then read a letter from Mr. John Ortton, of the Canada Southern Railway, in which he said:

LETTER FROM MR. JOHN ORTTON.

"The rules, as they now stand, appear to cover all that is required for equitable dealing, and if every railroad company through its officials would live up to the text and spirit of the rules there would be little need for alteration or cause for complaint."

After citing various violations of the rules, Mr. Ortton said:

"I would like to suggest one or two slight additions—for instance, in Rule 3, which shows for what defects cars may be refused. I would like to add to clause 'N,' or make it to read as clause 'O': 'Doors not furnished with good fastenings, such as a latch, eye-bolt and pin, drilled for the use of sealing wires.' This may seem a small thing in itself as an objection to receiving a car, but in reality it is a very important one for the safety of the freight carried in the car, because for the lack of good, secure fastenings, many a good car is defaced on the sides by cleats and nails driven against and through the doors to secure them and prevent their being easily opened; and every freight agent could give numerous instances where, because of the doors not being securely fastened, he has had to pay heavily for peculations and abstractions. The sealing wire system is acknowledged to be the simplest and safest fastening known, and its application to any car costs but a few cents.

"Another addition I would like to see in Rule 5, which now reads, 'In case a car has defects which do not render it unsafe to proceed on its journey before being repaired, the inspectors shall note such defects and the car may be accepted, subject to being received back in the same condition.' The addition I would suggest would read: 'But should the car reach its home in the defective condition specified on a card attached to the car, such defects may be repaired by the owners, and the cost charged to the road which damaged the car.'

* * * * * * * * *

"The rules as they now are have made the interchange of cars one of the easiest problems ever solved, and all that is required to render them effective is for every one concerned to determine he will act up to them to the best of his means honestly, honorably and with integrity."

Mr. L. GAREY said that their friend Ortton, being a resident of Canada, was compelled to have cars with an arrangement for sealing in order to have them pass through the hands of the government officers in entering and leaving Canada. It would be next to impossible to do the present business of the railroads without the carding system. It would be very difficult at many of the interchange points to collect a sufficient number of cars to transfer the freight, to say nothing about the expense of transferring for slight repairs that could be covered by cards.

Mr. LENTZ said that some time ago on one of our Western roads one of his cars was broken up which had a phosphor-bronze journal bearing, which cost his road about 35 cents a pound. The road destroying the car ordered journal bearings for that car, and he sent it phosphor-bronze and charged it the price, 35 cents a pound. It took exception to the bill, claiming that under Rule 16 only 20 cents a pound could be charged. There was where there was a difference of opinion. He took it that Rule 13 should apply, which reads: "Such repairs shall be permanently and thoroughly made, and shall conform to the design in detail of the original construction, provided the same can be determined from the car itself and with the same form, kind and quality of material originally employed." He contended that if that car had a phosporbronze bearing (which his road had found, to its entire satisfaction, to be a great deal better than the ordinary brass), the party losing that journal bearing or destroying it should pay for the replacing of it at the price that it cost the owner of the car. He might say further in regard to it that if this Rule 16 read simply "journal bearings shall be charged at 20 cents a pound" he would not think of raising the question; but it reads "*brass* journal bearings shall be charged at 20 cents a pound." Therefore he contended that if he was using a better material to run his cars over the road, he should be paid for that betterment of the cars, and he thought the convention when they adopted these rules by inserting that word *brass* meant that brass should only be charged at 20 cents a pound and other material at cost.

Mr. ADAMS said that he agreed with Mr. Lentz.

Mr. MARDEN asked the chairman how he construed the rule.

Mr. L. GAREY said the rule appeared to him to be very plain. The interchange of materials which is designed to be covered by these rules was to enable parties to obtain from the owners of cars any materials that they might require to put those cars in condition to continue in the trains without detention. If a case occurred which was not covered by these rules, such as the loss of a bearing when another has to be supplied, it would change some what the condition of things in a way which the rules do not anticipate. If the journal bearings had been worn out in actual service under the cars in question, and the party who had these cars on hand and was under the necessity of supplying new ones at its own expense were to call for bearings, and the parties were using a bearing that cost 75 cents a pound, he did not think they would be warranted in charging any price exceeding that named in the rules, 20 cents per pound. But in case the bearings were as good as new under these cars and had been lost through accident it changed the circumstances under which the rules were supposed to act. It appeared to him that while it might be right and just for the parties furnishing the material to charge at cost, they could not exceed the price named in the rules in making the interchange; not but that they would be the losers. Parties who call for an article would be notified that what was used under these cars was of a value exceeding the cost named in the rules. In that case the parties asking for them could receive them or not as they chose, and it appeared to him to be a question to be settled between the parties interested.

Mr. MARDEN asked if the words "brass bearings" covered all bearings used under cars, such as phosphor-bronze, lead-lined, Babbitt metal or any composition that might be used.

Mr. L. GAREY said it was the intention of the rule to cover journal bearings, and it should be so worded.

Mr. ADAMS said: "If that is the interpretation of that rule, how do you get over the other rule, which says that you must repair the car with the same kind and quality of material as that with which it was built? Some of the cars running over our road use the Congdon brake-shoe. I send to Mr. Garey for them, and he charges 4 cents a pound. The rules say 2½ cents. I object. He said he paid 4½ cents for them, and I conceded the point and paid the bill. I think the rule was intended to cover ordinary journal bearings."

A long discussion here followed on the question without, however, developing anything materially different from that reported above.

Mr. ADAMS asked if any parties were at liberty to splice their own car sills in line cars under the rules. He meant the middle timbers.

Mr. GAREY said they had not. He did not consider that the owner had the right to offer for interchange cars repaired contrary to the intent of the rules. While they could use cars repaired in any manner they chose upon their own road, they should not be permitted to pass cars that are not constructed or repaired according to the intent of the rules.

Mr. MARDEN said they must work with their rules and regulations in such a way as to forward instead of blockading freight, as it is charged that their inspectors did at present. If they did not interpret the rules aright, it certainly was their duty to keep them informed as to what is the right interpretation.

The Secretary then read a letter from Mr. Thomas Aylesbury, Master Car-Builder of the Kansas City, St. Joseph & Council Bluffs Railroad, in which he said:

LETTER FROM THOMAS AYLESBURY.

"There is one matter in the interchange of cars that has and is now giving us a great deal of trouble, and that is not

touched upon in the 'rules,' and that is where several roads centre in one place, as Kansas City; for instance, the Kansas City, Ft. Scott & Gulf road delivers one of its cars in good order to the Hannibal & St Jo road, this car goes east over road, is delivered to other connecting lines, arrives in Chicago, Buffalo or New York, and is returned by some other route, loaded it may be, but more likely empty, gets into a wreck is repaired by some foreign road with different draw-bars, oil-boxes or brake-shoes, and is received at the north or east terminal points of our road. Our car inspector on looking over his record of cars delivered finds no record of this car, as it went east by another road, and of course he does not know how or in what condition the car was delivered by the owner. He receives the car and it is hauled over our road one or two hundred miles and delivered to the owner, who refuses it on account of foreign castings, or the work may not be done as it should be. Now here is this car on our hands; our company may not have received one cent of compensation for hauling it. As I said, it is more likely to be empty than loaded. We write the parties from whom we have received the car to know what they will do about it. They reply that the car was in the same condition when received by them as when delivered to us, and they decline to do anything. The owner of the car still refuses to receive it, and after switching it around for a week or two and becoming desperate and disgusted we change the castings or do the repairs and turn the car over to them. Now this is no fancy sketch, but is happening very often. If you can apply a remedy you will at least receive the thanks of one who has been pestered by this feature of the interchange of cars.

"The card provided in the rules may be tacked on, describing defects, but what good is it when the car must be hauled back perhaps a thousand miles."

Mr. L. GAREY: "In Buffalo, some days ago, I was talking with a prominent man who has a great deal to do with freight, and he called my attention to the difficulty of knowing who owned cars having certain initials on them. He says there are five roads with the initials C. P. R. R.—the California Pacific, the Central Pacific, the Canada Pacific, the Cotton Plant and the Concord & Portsmouth. With the initials C. C. R. R. are the Colorado Central, the Connecticut Central, the Canada Central, the Carolina Central, the Central City, the Concord & Claremont, the Carson & Colorado and the Cheraw & Chester. He suggested that if the full name of the road were stenciled on one end of the car in small letters, it would assist the freight agents very materially."

The meeting then adjourned.

THE SCRAP HEAP.

Permissive Block Signals.

In commenting on the Canonbury accident, which occurred on Dec. 10, and in which four trains came into collision in a tunnel between Finsbury Park and Canonbury stations on the Great Northern Railway (England), Col. Yolland, one of the Board of Trade inspectors, says: "Permissive block working should not be allowed on any lines where the traffic is heavy, and with very short intervals of time between the trains."

Hardening Steel Tools.

To prevent the cracking of cast steel in hardening, a correspondent of the *Metall-Arbeiter* says he places the article before hardening it in a tin box, packing it with clean wrought-iron drillings, and, luting the box carefully, heats the whole slowly to a dark red. After cooling it as gradually, he finds that all internal strains, which otherwise would have developed cracks in the tool during hardening, are removed, and that after such annealing before hardening, no trouble, he says, is ever experienced; but he does not say anything as to the effect of the process on the steel.

Old Locomotive on the Great Western (of England) Railway.

A correspondent of the *English Mechanic* describes an old locomotive on this line as follows:

"The 'Thunderer' was an engine built by Brunel, and constructed by Messrs. Hawthorn in 1837, the patent being that of Mr. T. E. Harrison, who later on became chief engineer to the Northeastern Railway. The boiler was on a separate six-wheeled frame, the engine proper running in front with four-coupled 6-ft. wheels. The cylinders were 16 by 20 in., and the shaft spur-geared 3 to 1 on the driving axle, thus making the driving-wheels revolve as rapidly as if they had been 18 ft. in diameter. Boiler, 44-in. diam.; 125 tubes, 1⅝ in. diam., 8 ft. 7 in. long; fire-box, very large with a bind-feather; grate-area, 17⅛ sq. ft.; heating surface tubes, 516; box, 108¼; total, 624¼ sq. ft.; weight of engine proper, 12 tons; diam. of chimney, 16 in. It had a very short career, its light weight and small tractive force, 24.17 lbs., being insufficient. The grate was 3 ft. 8⅛ in. long by 5 ft. wide, and the box was 3 ft. 11 in. high above the grate."

Another correspondent says of it:

"The 'Thunderer' was like the 'Fontaine' engine only in having the driving-wheels driven by spur gearing. In every other respect she was totally different. Her boiler was on a separate carriage from the engine, the steam being transmitted by a jointed pipe. Her cylinders were 16 by 20; the ratio of the gearing was 3 to 1; the driving-wheels, which were coupled, were 6 ft., corresponding to 18-ft. wheels had they been worked upon the first motion. The boiler was 3 ft. 8 in. diameter; tubes, 135, 1¾ in. diameter, 8 ft. 7 in. long; heating-surface of fire-box, which had a mid-feather, as much as 108 square feet. Designed by Mr. Harrison, of the N. E. R., and built about 1837. The engines alone weighed 12 tons. The 'Thunderer' proved a complete failure."

ANNUAL REPORTS.

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Connecticut River.

This company owns a line from Springfield, Mass., to South Vernon, 50 miles, with branches from Chicopee Junction to Chicopee Falls, 2.35 miles, and from Mt. Tom to Easthampton, 3.50 miles. It leases the Ashuelot road, from South Vernon to Keene, N. H., 24 miles, making 79.85 miles worked. The report is for the year ending Sept. 30.

The company owns controlling interests in the Vermont Valley road, from Brattleboro to Bellows Falls, and the Sullivan County road, from Bellows Falls to Windsor, but does not work those lines.

The general account is as follows:

Stock		$2,100,000.00
Notes payable		315,400.00
Vouchers, accounts, etc		362,341.07
Profit and loss		678,839.54
Total		$3,456,580.61
Road and equipment	$2,637,459.39	
Other permanent investments	105,661.47	
Bills and accounts receivable	451,985.57	
Materials	180,159.63	
Cash	81,314.55	
		3,456,580.61

The company has no bonded debt of any description.

The earnings for the year were as follows:

	1880-81.	1879-80.	Increase.	P. c.
Passengers	$331,044.07	$302,271.85	$28,772.22	9.5
Freight	430,567.46	386,669.45	52,898.01	13.7
Mails, etc	41,394.59	37,119.19	4,275.40	11.5
Total	$812,006.12	$726,060.49	$85,945.63	11.8
Expenses	590,110.63	512,014.76	75,095.87	15.2
Net earnings	$221,895.49	$214,045.73	$7,849.76	3.7
Gross earn. per mile	10,169.14	9,092.81	1,076.33	11.8
Net " "	2,778.90	2,680.60	98.30	3.7
Per cent. of exps	72.67	70.52	2.15	....

The increase in earnings was made in spite of a decrease in passenger rates and in freight rates on coal. The increase in expenses was due to increase in cost of labor and material, to increase in train mileage, and to large renewals and improvements. Included in expense are three new locomotives, several new cars, enlargement of Springfield freight house and a number of new buildings on the line.

There were 625 tons of steel rails and 46,125 ties used in renewals. All of the main line is now laid with steel and the road-bed is generally in good order.

The income account was as follows:

Net earnings, as above		$221,895.49
Interest received		14,155.70
Total		$236,051.19
Rentals	$19,027.07	
Interest paid	15,335.52	
Dividends, 8 per cent	168,000.00	
		202,362.59
Surplus for the year		$33,688.60
Balance, Oct. 1, 1880	$645,317.67	
Less charges to profit and loss	166.73	
		645,150.94
Surplus, Sept. 30, 1881		$678,839.54

Negotiations are pending for land for a new passenger station and enlarged yard at Holyoke. The new union station at Greenfield has been in use since May 1. A connection has been made with the New Haven & Northampton station at Northampton by a covered arcade.

The traffic for the year was as follows:

	1880-81.	1879-80	Inc. or Dec.	P.c.
Train miles	518,554	442,444	I. 71,110	16.1
Passengers carried	1,278,275	1,122,080	I. 156,195	13.9
Passenger miles	13,103,698	11,665,237	I. 1,438,361	12.3
Tons freight carried	563,859	469,029	I. 94,830	20.2
Ton miles	14,775,320	11,551,793	I. 3,223,527	27.9
Av. receipts:				
Per train mile, gross	160.0 cts.	165.0 cts.	D. 5.0 cts.	3.0
Per train mile, net	45.7 "	52.4 "	D. 6.7 "	12.8
Per passenger per mile	2.5 "	1.7 "	I. 0.8 "	47.1
Per ton per mile	3.0 "	3.3 "	I. 0.6 "	18 2

Maintenance of way cost 25.12 cents per mile run; repairs of locomotives, 6.50 cents; repairs of cars, 10.10 cents; repairs of passenger cars, 6.06 cents; fuel, 16.00 cents.

Station expenses were 7.88 per cent. of gross earnings; general expenses, 2.90 per cent. and taxes, 6.10 per cent.

The average mileage of the 33 locomotives owned was 15,641 miles each for the year. The average was reduced by the fact that three new engines received and seven leased early in the year to the Vermont Valley road made a very small mileage on this road.

On Sept. 21 Cheapside Bridge over the Deerfield River, 770 ft. long and 90 ft. high, was destroyed by fire, making the second wooden bridge at this point which has been burned. A connection around the break was made by using the tracks of the Fitchburg and the New Haven & Northampton tracks, about 1,000 ft. of new track being laid to complete the connection. A new iron bridge was contracted for, and is now under construction.

Utica & Black River.

This company owns a line from Utica, N. Y., to Philadelphia, 87 miles. It leases the Black River & Morristown, which extends the road to Morristown on the St. Lawrence, 37 miles; the Ogdensburg & Morristown (really owned), which extends it 10 miles further to Ogdensburg; the Clayton & Theresa, a branch from Theresa to Clayton on the St. Lawrence, 16 miles, and the Carthage, Watertown & Sackett's Harbor, a branch from Carthage to Sackett's Harbor on Lake Ontario, 30 miles. The total mileage is 180 miles. The report is for the year ending Sept. 30, 1881.

The equipment consists of 22 locomotives, 23 passenger and 10 baggage cars, 277 freight cars. The increase during the year was 2 locomotives and 67 freight cars.

The general account is as follows:

Stock		$1,772,000.00
Bonds, 7 per cent		1,112,000.00
Bills and accounts payable		55,645.50
Surplus		320,277.09
Total		$3,259,922.59
Road and equipment	$2,878,702.66	
Leased lines, stocks and bonds	183,100.00	
" advances	128,266.50	
Accounts receivable	7,753.23	
Cash	62,100.20	
		3,259,922.59

The rentals paid are for the Black River & Morristown, 7 per cent. on $495,000 bonds; for the Clayton & Theresa, 7 per cent. on $200,000 bonds, and for the Carthage, Watertown & Sackett's Harbor, 37½ per cent of gross earnings. There was no change in stock or bonds last year.

The traffic, as reported to the State Engineer, was as follows:

Train miles:	1880-81.	1879-80.	Inc. or Dec.	P.c.
Passenger	293,084	286,030	I. 7,054	2.5
Freight	182,130	146,847	I. 35,292	24.0
Total	475,223	432,877	I. 42,346	9.8
Passengers carried	257,236	236,656	I. 20,580	8.7
Passenger miles	7,377,199	5,836,600	I. 1,540,599	26.4
Tons freight carried	199,383	160,932	I. 38,451	23.9
Ton miles	12,918,373	9,204,785	I. 3,713,588	40.3
Av. train load:				
Passengers, No	25.17	20.41	I. 4.76	23.3
Freight, tons	70.94	62.70	I. 8.24	13.0
Av. receipt:				
Per pass. per mile	3.36 cts.	3.77 cts.	D. 0.41 ct.	10.9
Per ton per mile	3.17 "	3.73 "	D. 0.56 "	15.0

Included in freight were 15,467 tons coal, 27,219 tons iron ore, 26,099 tons lumber, 22,466 tons of grain and flour and 16,510 tons of provisions.

The earnings for the year were as follows:

	1880 81.	1879-80.	Inc. or Dec.	P. c.
Passengers	$248,154.28	$220,350.83	I. $27,803.45	12.6
Freight	410,087.86	334,800.07	I. 75,287.79	22.5
Mail, etc	34,927.86	35,609.64	D. 681.78	1.9
Total	$693,170.00	$590,760.54	I. $102,409.46	17.3
Expenses	446,389.77	274,989.18	I. 171,400.59	62.3
Net earnings	$246,780.23	$315,771.36	D. $68,991.13	21.8
Gross earn'gs per mile	3,850.94	3,282.00	I. 568.94	17.3
Net earnings per mile	1,371.00	1,754.20	D. 383.29	21.8
Per cent. of expenses	64.40	46.55	I. 17.85	.....

The earnings show a very considerable increase. The expenses were increased by unusual renewals and by the payment of a considerable amount for supplies, which should have been in the previous year's account, but were delayed in delivery.

The income account was as follows:

Net earnings, as above		$246,780.23
Interest, etc., received		8,858.54
Total		$255,638.77
Interest	$81,440.00	
Rental, Black River & Mor.	34,650.00	
" Clayton & Theresa	14,000.00	
" Car., Wat. & Sackett's Harbor	23,073.82	
Dividends, 4 per cent	70,880.00	
		224,043.82
Surplus for the year		$31,594.95
Suplus, Sept. 30, 1880		288,682.14
Surplus, Sept. 30, 1881		$320,277.09

There was expended for new work and additions to property above renewals, the sum of $65,500, the money being advanced from earnings.

During the year, 1,500 tons of steel rails were used in renewals, and seven wooden bridges were replaced by iron. Two engines and 50 freight cars were bought. Contracts have been made for 100 cars and 1,000 tons of steel rails. A new station was built at Watertown, an engine house at Carthage, and additions made to the buildings at Utica.

The Carthage, Watertown & Sackett's Harbor rental was $1,052.83 in excess of interest due; that amount was applied in reduction of balance due. Expenditures for the leased lines were $3,075.93 for the Clayton & Theresa, $4,642.45 for the Black River & Morristown, and $100 for the Ogdensburgh & Morristown.

The road has been kept in good condition and the operations of the year have been generally successful.

Troy & Greenfield.

This road, which includes the Hoosac Tunnel and is owned by the state of Massachusetts, extends from Greenfield, Mass., to the New York state line, 49.77 miles. Of this the portion known as the Southern Vermont road, from the Massachusetts line across the southwestern corner of Vermont to the New York line, 6.17 miles, is leased to the Troy & Boston Company. The Troy & Boston and the Boston, Hoosac Tunnel & Western run trains over the road from the Vermont line to North Adams, 6.60 miles. The Fitchburg Company runs trains from Greenfield to North Adams, 37 miles, and the New Haven & Northampton runs trains from Conway Junction to North Adams, 28 miles, all paying tolls on the business carried. The Manager's report to the state is for the year ending Sept. 30.

The traffic for the year was as follows:

	1880-81. East.	1880-81. West.	1879-80. East.	1879-80. West.
Loaded cars moved	63,863	31,981	54,402	23,850
Empty cars moved	1,015	31,148	933	29,538
Total	64,878	63,129	55,335	53,388
Passengers carried	90,891	89,559	62,340	114,386
Passenger miles	1,667,206	1,981,576	1,455,420	1,707,365
Tons freight carried	774,390	153,558	578,511	126,632
Ton miles	29,889,518	6,004,370	21,696,687	4,544,244

The total passenger miles were 3,638,782; ton miles, 35,893,888. In addition to the above 6,088 tons of fuel and materials for operating companies were carried.

The number of trains passing through the tunnel was: Passenger, 4,012; freight, 4,740; light engines, 450; pushers, 1,640; gravel and construction, 1,811; special, 75; total, 12,728, against 10,624 the previous year.

The earnings of the road for the year were as follows:

	1880-81.	1879-80.	Inc. or Dec.	P. c.
Tolls on passengers	$54,296.50	$47,885.47	I. $6,411.03	13.3
Tolls on freight	168,357.56	145,612.64	I. 22,744.92	15.6
Tolls, other	5,868.37	4,713.92	I. 1,154.45	2.5
Total tolls	$228,522.43	$198,212.03	I. $30,310.40	15.3
Rents	12,000.00	12,000.00	.....	.....
Miscellaneous	4,934.99	5,207.72	D. 272.73	5.2
Total	$245,457.42	$215,419.75	I. $30,037.67	13.8
Expenses	183,296.41	123,760.55	I. 59,535.86	48.0
Net earnings	$62,161.01	$91,659.20	D. $29,498.19	32.2

The expenses do not include any charge for train service except hauling construction trains and switching in North Adams yard. The train service is done by the companies whose trains run over the road.

The tolls collected of the companies using the road were as follows:

	1880-81.	1879-80.	Inc. or Dec.	P. c.
From Troy & Boston	$23,847.87	$28,294.32	D. $4,446.45	15.8
Boston, H. T. & W.	16,104.98	7,840.08	I. 8,264.90	105.4
Fitchburg	186,693.00	162,077.63	I. 24,615.37	15.2
N. H. & Northampton	1,876.58	.....	I. 1,876 58	....
Total	$228,522.43	$198,212.03	I. $30,310.40	15.3

This does not include the $12,000 rent paid by the Troy & Boston Company for the road through Vermont which it leases. The New Haven & Northampton Company did not begin to run trains over the road until July 13, 1881.

The greatest work remaining to be done on the road is the completion of the second track, the estimated cost of which is $514,522, in addition to appropriations already made.

The total expenditures on the road for the year were:

For operation	$183,296.41
For construction authorized by the Legislature	345,584.91
Total	$528,883.32

The chief new work has been on the second track, for which a large part of the grading has been done, although there is still much rock-cutting and other heavy work to be finished. Several sidings have been laid for passing trains, which will be part of the second track when it is finished.

A locomotive and 35 dump cars were bought, making the equipment owned by the state 3 locomotives; 12 flat, 55 dump and 2 caboose cars; 1 derrick car and 1 snow-plow.

The balance on hand Sept. 30, 1880, with the appropria-

IOWA MINOR RAILROADS IN 1880-81.

Name of Road.	Property. Miles owned	Miles leased	Locomotives	Pass. train cars	Freight cars	Capital. Stock	Bonds	Other debt	Train mileage	Earnings. Gross earnings	Expenses	Net earnings	Gross earnings per mile	Net earnings per mile	P. c. of exps.	Interest, rentals and dividends
						$	$	$		$	$	$	$	$		$
Burlington & Southwestern*	142		9	6	124					267,799	274,243	†6,444	1,476		102	41,627
Central Iowa	191		24	19	809	4,324,800	3,700,000		643,477	938,182	800,134	138,048	4,064	598	85	271,000
Crooked Creek	9		1	1		71,500		20,000		9,670	12,751	†3,081	1,138		132	2,000
Des Moines & Ft. Dodge	87		11	9	149	3,758,280	2,350,000		169,515	345,365	255,405	89,960	3,970	1,034	74	95,500
Dubuque & Dakota	63		2	1	53	566,000	622,000	63,234		58,286	45,239	13,047	925	209	78	30,480
Sioux City & Pacific	264		21	18	576	2,068,400	3,256,320	1,801,064	515,312	628,236	494,395	133,841	2,570	546	79	118,817
Narrow-gauge roads:																
Des Moines & Northwestern	29					242,400	150,000	32,468	26,196	45,446	28,599	16,847	1,595	592	62	
Ft. Madison & Northwestern	12		1	1	20	40,000				11,358	7,852	3,506	947	293	69	
Iowa Eastern‡	16		1	3	29					7,064	12,539	†5,475	441		178	
Cedar Rapids & Marion	5		2	4		18,000	8,400			10,079	8,063	2,016	2,016	403	80	43

* In process of reorganization. † Deficit. ‡ Capital not reported.

The above figures are from the report of the Iowa Railroad Commission for the year ending June 30, 1881; only those roads are included which do not otherwise report and are not included in lessees' returns.

tions of 1880, was $536,624.53; expenditures for new work, $345,584.91, leaving $191,139.62 to be used in 1882.

The work at the central shaft in the tunnel has been completed, and nearly all the niches for trackmen in the tunnel have been finished. The work of laying the second track through the tunnel has been begun and will be finished during the present winter. The enlargement of the North Adams yard has been begun, and a carpenters' shop and lumber yard provided.

The switching in the North Adams yard is now under charge of the Manager; the expenses are about $10,000 a year. The car records at North Adams are now all kept in the state office.

Full renewals have been made to keep the road and track in good condition. The insulated cables laid through the tunnel have not worked well, and a new telegraph line will have to be built over the mountain.

Cincinnati, New Orleans & Texas Pacific.

This company leases the Cincinnati Southern road from Cincinnati to Chattanooga, 335 miles. At the recent annual meeting the following statements were presented for the period from Oct. 12, the beginning of the lease, to Dec. 31, 1881, two months and 20 days.

The capital statement is as follows:

Stock subscribed		$3,000,000.00
Capital account and property of former lessee, organization expenses, etc.	$1,089,161.62	
Expended on capital account by Co.	152,863.19	
		2,142,024.81
Unexpended balance of capital, Dec. 31		$857,975.19

The company bought the equipment and other property in use by the former lessee.

The earnings were as follows:

Passengers	$150,561.39
Freight	433,181.78
Mail, express and miscellaneous	29,975.84
Total ($1,832 per mile)	$613,719.01
Working expenses (53.9 per cent.)	326,421.98
Net earnings ($858 per mile)	$287,297.03
Paid Trustees rental of road	176,344.08
Surplus	$110,952.95

The rental for the first year is $800,000. After deducting from the surplus 1 per cent. on stock as a sinking fund and 1½ per cent. as a quarterly dividend, there remains a balance of $35,952.95.

Capital expenditures included $41,346.24 for bridges and masonry; $16,051 for arching tunnels; $7,506.74 for filling trestles; $8,016.75 for new rails; $3,877.88 for ballast and $61,450 for freight cars.

Perkiomen.

This company owns a line from Perkiomen Junction on the main line of the Philadelphia & Reading road, north to Emaus Junction on the East Pennsylvania Branch, 39 miles. It was formerly leased to the Reading, but the lease was surrendered when that company leased the North Pennsylvania road, on account of a provision of the Pennsylvania constitution prohibiting the operation of parallel lines by the same company. The report is for the year ending Nov. 30.

The bonded debt consists of $799,600 first-mortgage bonds and $1,125,000 consolidated bonds, all bearing 6 per cent. interest. These bonds are guaranteed by the Philadelphia & Reading Company.

The passengers and freight carried were as follows:

	1881.	1880.	Increase.	P.c.
Passengers carried	128,252	121,526	6,726	5.5
Tons freight carried	501,047	651,736	14,097	2.2
Tons coal carried	164,592			

The average rate received per ton per mile on freight was 1.31 cents; on coal, 1.60 cents.

The earnings for the year were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Passengers	$36,364.80	$37,921.20	D. $1,556.40	4.1
Freight	324,172.65	314,737.07	I. 9,435.58	3.0
Other	4,371.16	4,100.71	I. 270.45	6.6
Total	$364,908.61	$356,758 98	I. $8,149.63	2.3
Expenses	238,281.14	252,156.05	D. 13,874.91	5.5
Net earnings	$126,627.47	$104,602.93	I. $22,024.54	21.1
Gross earn. per mile	9,356.63	9,147.67	I. 208.96	2.3
Net earn. per mile	3,240.86	2,682.13	I. 564.73	21.1
Per cent of exps.	65.30	70.08	D. 5.38	

Payments from net earnings were $3,497.90 for equipment and $115,476 for interest on bonds; total, $118,973 90, leaving a balance of $7,653.57, which has been expended in fitting trestles and repairing stations.

Local passenger and freight business increased, while through business decreased. In coal there was an increase both in through and local tonnage.

Denver & Rio Grande.

A circular has been issued by this company giving approximate results of operations for the year ending Dec. 31, 1881.

At the close of the year the company had 1,068 miles of road, an increase of 511 miles during the year. The average mileage worked was 786 miles. There are under construction 238 miles of road, the chief lines being the extension to Silverton, 27 miles, and the line from Gunnison to the Utah border, 162 miles.

The equipment in use on the road is 170 locomotives, 134 passenger-train cars and 4,483 freight cars. Of these, 29 locomotives, 24 passenger-train cars and 553 freight cars are owned by the company; the rest are held through equipment trusts, on which the sum of $300,000 has been paid.

The stock, bonds, etc., on Dec. 31 were as follows:

Stock	$24,160,000
Bonds	23,067,500
Rolling stock trust certificates	2,750,000
Total	$49,977,500

To this should be added the subscription for $5,000,000 stock and $1,000,000 bonds brought out in London, making $55,977,500. The company has no floating debt.

In the statement given below the amount of interest on consolidated bonds is ascertained by computing the amount of consolidated bonds (at $15,000 per mile) issued on the average mileage for the year; all interest paid on bonds above the amount so ascertained is charged to construction. The amount charged for dividends on stock was in the same way estimated on the stock issued on the average mileage for the year, the balance being charged also to construction.

The statement is as follows:

Gross earnings ($7,897 per mile)		$6,206,812
Expenses (58 per cent.)		3,600,000
Net earnings ($3,317 per mile)		$2,606,812
Interest on old bonds	$519,575	
" consolidated bonds charged to income	471,450	
Interest on coupon certificates and fractional bonds	7,185	
Interest on rolling stock trusts	180,000	
Taxes and insurance	79,978	
		1,258,188
Balance		$1,348,624
Dividends, 6 per cent., charged to income		914,100
Surplus		$434,524

There was also $235,000 paid on principal of rolling stock trusts and charged to equipment account.

The actual amount accruing for interest on all outstanding bonds during the year was $1,325,585, of which, under the rule adopted, the sum of $991,025 was charged to income as above, and the balance, $334,560, was charged to construction. In like manner the actual amount of dividends paid was $1,260,000, of which the sum of $914,100 was charged to income, and the balance of $345,900 to construction.

If the entire amount of interest and dividends be charged to income, the result appears as follows:

Net earnings as above		$2,606,812
Interest accrued	$1,325,585	
Other charges as above	267,163	
		1,592,748
Balance		$1,014,064
Dividends paid		1,260,000
Deficit		$245,936

The company's officers estimate that for the current year there will be a large increase in earnings without allowing for new mileage to be built. They also say that the expenses can be reduced, and on this basis claim that the road will earn over 7 per cent. on the stock above all charges. These figures, of course, are largely conjectural.

Long Island.

This company owns or leases and works a system or network of railroads covering nearly all of Long Island, except a small district about Coney Island at the western end. The whole system includes 335 miles of road, the longest lines being from Hunter's Point to Greenport, and from Bushwick to Moriches. The following statements are for the year ending Sept. 30:

The equipment consists of 79 locomotives; 229 passenger train cars and 511 freight cars.

The stock of the company, now authorized, is $10,000,000. Arrangements are now being made to fund all the bonded debt in a consolidated mortgage for $5,000,000, which will include an issue for improvements and new equipment.

The earnings for the year were as follows:

	1880-81.	1879-80.	Inc. or Dec.	P.c.
Gross earnings	$1,947,378	$1,811,849	I. $135,529	7.5
Expenses	1,363,278	1,365,856	D. 2,578	0.2
Net earnings	$584,100	$445,993	I. $138,107	30.9
Gross earn. per mile	5,901	5,752	I. 149	2.6
Net " " "	1,770	1,416	I. 354	25.3
Per cent. of exps.	70.02	75.37	D. 5.35	

The statement says: "Under the present management, which took possession of the property Jan. 1, 1881, the company has paid off and retired over $2,000,000 of interest-bearing indebtedness, and funded over $1,000,000 of bonds bearing 7 per cent. interest into the new 5 per cent. loan; it has absorbed several of its leased lines and secured large interests in others; it has purchased a large and valuable dock property at Long Island City, hitherto leased under heavy rentals, and added to its terminal property in Brooklyn by purchase, and to the depot property at other points. Handsome new station-houses have been built at Islip, Babylon and Far Rockaway. Nearly every station and platform on the entire line has been rebuilt or renewed. Over 30 bridges have been rebuilt. Upward of 30 miles of iron rails have been replaced with new steel. The Montauk Division has been extended 15 miles to connect with the Sag Harbor Branch. During the entire year the shops of the company have been crowded to their utmost capacity in rebuilding and renewing the motive power and equipment.

"During the year, 100 new freight cars were added by purchase. Sixteen new parlor coaches, from which the company derives a revenue in addition to the regular passenger fares, were placed upon the road by the Woodruff Company.

"Six new passenger engines of the largest size have been contracted for, also 20 new passenger coaches of the Pennsylvania Eastlake pattern. The company has also purchased 10,000 tons of steel rails to be rapidly placed in the track."

Delaware, Lackawanna & Western.

This company, according to its usual custom, publishes the following brief statement for the year ending Dec. 31, the only report which it makes public.

The company owns 207½ miles of road and a great coal property in Pennsylvania. It leases 186¼ miles of railroad in New York, and 151 miles in New Jersey; works under contract 44 miles in New York and controls 81 more in the same state, making in all 670 miles of railroad owned, controlled or leased and worked. In the statements no distinction is made between the receipts from transportation and those from the coal business.

The capital account was as follows, compared with the same account at the close of 1880:

	1881.	1880.	Inc. or Dec.
Stock	$26,200,000	$26,200,000	
Bonds	4,044,900	5,677,900	D. $1,633,000
Balance due on account of bonds retired March 1, 1881.	1,200,000		I. 1,200,000
Surplus account	7,585,297	5,148,427	I. 2,436,870
Total	$39,030,197	$37,026,327	I. $2,003,870
Construction accounts	30,873,357	30,278,732	I. 594,625
Materials on hand	1,121,850	1,264,344	D. 142,494
Stocks and bonds owned	6,265,521	4,697,520	I. 1,568,001
Net current accounts	769,469	785,731	D. 16,262
Total	$39,030,197	$37,026,327	I. $2,003,870

The most notable changes are the large decrease in bonded debt and the large increases in surplus account and in stocks and bonds owned.

The item of net current accounts is the balance obtained from the following statement of accounts:

Receivable:		
Cash and demand loans		$781,781
Coal on hand		558,873
Advances to leased lines		336,646
Advances on coal to be delivered		608,014
Coal bills and sundry accounts due		1,519,193
Total		$3,804,507
Payable:		
Dividends, interest and rentals not called for.	$98,452	
Dividends, interest and rentals accrued, not due till after Jan. 1	1,576,091	
State taxes, payable after Jan. 1	282,180	
Accounts due and payable after Jan. 1	631,673	
December pay-rolls, payable after Jan 1	446,642	
		3,035,038
Balance, net current accounts		$769,469

The advances to leased lines, included as a cash asset, are generally payable in stock or other securities.

The coal traffic for the year showed an increase of 822,814 tons, or 19.8 per cent. The coal traffic for eight years has been as follows:

	Tons.		Tons.
1881	4,983,736	1877	2,369,880
1880	4,160,922	1876	2,400,104
1879	4,487,911	1875	3,404,242
1878	2,643,544	1874	3,112,221

There was an increase last year, not only in tonnage of coal mined and carried, but also in the prices received for it.

The income account was as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Gross earnings	$27,796,526	$21,656,604	I. $5,739,922	26.5
Expenses	19,632,662	15,753,133	I. 3,879,529	24.6
Net earnings	$7,703,864	$5,903,471	I. $1,860,393	31.5
Interest and rentals	3,558,494	3,627,381	D. 68,887	1.9
Profit	$4,205,370	$2,276,090	I. $1,929,280	84.8
Dividends	1,768,500	786,000	I. 982,500	125.0
Surplus	$2,436,870	$1,490,090	I. $946,780	63.5

The surplus reported for 1881 was equivalent to 9.3 per cent. on the stock. The disposition of this surplus is not given.

Earnings and expenses given are from all sources, including all railroads and the coal property also.

In 1880 two dividends of 1¼ per cent. each were paid; in 1881 the dividends declared were two of 1¼ per cent. each, one of 1¾ per cent. and one of 2 per cent., making 6¾ per cent. in all.

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

DECEMBER EARNINGS.

Our table of railroad earnings in December has reports from 59 railroads, which in the aggregate had 45,373 miles of road in 1881, or about 45 per cent. of the total now in operation in the United States. This mileage was 12¼ per cent. more than the same companies worked in 1880, and their aggregate earnings were no less than 19.3 per cent. greater, their average earnings per mile of road having increased from $568 to $603, or 6.2 per cent. This is a better showing than the roads reporting have made since August. In November our table showed a *decrease* in average earnings per mile, and in successive months the percentage of increase or decrease in the average earnings per mile of the roads reporting has been:

Month.	Per cent.	*Month.*	Per cent.
January	D. 7.0	July	I. 4.8
February	D. 10.1	August	I. 6.9
March	D. 6.1	September	D. 1.6
April	I. 2.9	October	D. 5.1
May	I. 3.5	November	D. 1.3
June	I. 13.4	December	I. 6.2

Only in August and June was the increase so large as in December; but this is partly accounted for by the fact that in 1880 December earnings were a little less than in 1879, while in previous months they had generally been greater, and often very much greater.

Of the 59 roads reporting for December only nine had smaller total earnings in 1881 than in 1880, and 12 smaller earnings per mile of road.

The decreases are generally small; the largest is 18 per cent., on the Belleville Line; some of the increases are large, as 42 per cent. on the Alabama Great Southern, 51 on the Cincinnati Southern, 29 on the Hocking Valley, 69½ on the Houston, East & West Texas, 37½ on the Milwaukee, Lake Shore & Western, 29 on the Missouri Pacific, 47 on the Northern Pacific, 247 on the Ohio Central, 36½ on the Paducah & Elizabethtown, 44½ on the St. Paul, Minneapolis & Manitoba, 37 on the Scioto Valley and 29½ on the Wisconsin Central. Nearly all of these, it is true, are roads whose earnings per mile are still quite light (all but two below the average, and mostly very far below).

As usual a very large proportion of the roads reporting are Western lines—about three-fifths are west of Indiana. Another large proportion (more than a fifth) is in the South, while a comparatively small number of lines north of the Ohio and Potomac and east of Illinois report, this part of the country being precisely that which has the most railroads. The roads east of Ohio that report are but six, with 4,057 miles of road, which is about 20 per cent. of the total in operation there—much less than in other parts of the country. The absence of the Reading is not nearly made up by the presence of the Baltimore & Ohio, more than a third of the mileage of which latter is west of the Ohio; but the Baltimore & Ohio and Pennsylvania give a more complete idea than usual of the position of the trunk lines, though it is plain enough that the good degree of prosperity they had was not at all due to their through trunk line traffic. Of other roads, a large part of whose traffic consists of this business, or whose local rates are largely affected by them, the Chicago & Grand Trunk shows a large increase (it did not carry through passengers last year), the Indiana, Bloomington & Western and the Northern Central a small decrease, and the St. Louis, Alton & Terre Haute a large one; while the Wabash, whose lines east of the Mississippi are greatly affected by trunk line rates, but its large system west of them not at all, with an increase of 35 per cent. in mileage has an increase of 38 per cent. in earnings—all indicating a very satisfactory condition of local traffic; for these roads can scarcely have had any more December through traffic in 1881 than in 1880—most of them probably not as much, for it has been only from Chicago that shipments have been large—and the rates on through freight were probably more than 50 per cent. lower this year. There must have been gains in local traffic to overcome the large loss on through.

Ten roads chiefly engaged in carrying to Chicago and Milwaukee report. With an increase of nearly 7 per cent. in mileage they earned 23 per cent. more money, and their average earnings per mile of road increased from $441 to $508, or 15 per cent. Every one of these roads shows an increase.

Five roads engaged largely in carrying to St. Louis, with an increase of 9½ per cent. in mileage, have an increase of 23 per cent. in earnings, and their average earnings per mile increased from $560 to $628, or 12 per cent. One of the five has a decrease. The Chicago roads have more than four times the mileage of the St. Louis roads.

These two groups, however, with nearly one-third of the total mileage reporting in 1881, had only 28.6 per cent. of the total earnings, but fully one-third of the total increase of earnings. The other roads show on the average an increase from $622 to $637 in earnings per mile.

The 14 Southern railroads that report have an increase of nearly 11 per cent. in mileage, and of 13.6 per cent. in earnings, and their average earnings per mile increased from $481 to $493. Several of the Southern roads east of the Mississippi show decreases, and others very small increases.

Below we give our usual table showing earnings per mile in December for six successive years for all the roads from which we have had reports:

December earnings per mile of road 1876 *to* 1881.

	1876.	1877.	1878.	1879.	1880.	1881.
Ala. Gt. South.	....	....	....	$188	$211	$299
Burl., C. R. & N.	$246	$314	$287	406	343	395
Cairo & St. Louis	118	....	122	196	256	283
Central Iowa	....	307	344	...	426	480
Central Pacific	820	684	658	572	733	760
Chicago & Alton	552	467	503	658	684	750
Chic. & E. Ill.	438	374	398	513	586	654
Chic., Mil. & St P.	436	474	414	486	370	452
Chic. & N. W	502	485	502	579	535	609
Chic., St. P., Minn & Om	....	....	....	341	332	400
Cin., Ind. St. L. & Chic.	598	645	628	700	661	642
Cleve., Mt. V. & Del.	124	189	191	250	247	264
Denver & Rio G	182	240	....	359	634	606
Des Moines & Ft. D.	....	....	....	289	294	315
E. Tenn., Va. & Ga.	319	334	....	440	336	337
Flint & Pere M	....	....	....	418	475	531
Hannibal & St. Jo.	446	461	611	867	709	618
Ill. Cen., in Ill.	605	581	552	610	567	587
Ill Cen., in Iowa	264	335	294	335	375	423
Ind., Bloom. & N.	330	271	289	501	405	390
Louisville & Nash.	533	563	520	616	516	546
Memphis & Charles	435	498	...	486	540	471
Mem., Pad. & Nor.	149	169	158	132	149	153
Mo., Kan. & Tex	392	366	357	456	440	445
Mo. Pacific	761	746	....	...	464	599
Mobile & Ohio	587	595	573	626	568	518
Nash., Chat. & St. L.	408	468	428	409	377	371
N. Y. & New England	....	...	...	651	627	600
Norfolk & West.	306	379	334	475	425	460
Northern Cen.	1,120	1,077	1,028	1,272	1,516	1,462
Northern Pacific	....	....	....	179	306	447
Paducah & E'town	....	166	138	203	200	273
Pennsylvania	1,824	1,795	1,459	1,845	1,877	1,938
Peoria, Dec & Ev.	...	....	....	208	195	231
St. L. A. & T. H., Main Line	....	....	....	566	523	441
Belleville Line	765	583	684	912	682	561
St. L., Iron Mt. & S.	742	769	684	957	959	985
St. L. & San Fran.	381	322	305	421	376	446
St. P., Minn. & Man.	....	....	....	284	402	580
Scioto Valley	....	....	201	204	248	341
Texas & Pacific	551	643	586	732	431	363
Union Pacific	....	...	..	598	599	619
Wabash, St. L. & P.	....	....	....	453	388	396

The number that had *smaller* earnings per mile in 1881 in December than in previous years in that month were:

12	out of 43 reporting in			1880
18	" " 41	"	"	1879
5	" " 28	"	"	1878
10	" " 30	"	"	1877
7	" " 29	"	"	1876

In 1879 only did a large proportion of the roads (yet not half) have as large earnings per mile as in 1881. Traffic was generally heavy then and rates comparatively high and well maintained, but passenger traffic was not nearly so heavy as it has been since.

Of the roads whose earnings are given for all six of these years, or for five of them, the Cairo & St. Louis, the Chicago & Alton, the Chicago & Eastern Illinois, the Chicago & Northwestern, the Cleveland, Mt. Vernon & Delaware, the Iowa lines of the Illinois Central, the Paducah & Elizabethtown, the Pennsylvania, the Iron Mountain, and the St. Louis & San Francisco had larger earnings per mile in 1881 than in any other year of the six; while the Mobile & Ohio, the Nashville, Chattanooga & St. Louis, the Belleville Line of the St. Louis, Alton & Terre Haute, and the Texas & Pacific had then *smaller* earnings per mile than in any other year—the latter doubtless solely on account of its vast addition of new mileage in 1881, on which there is as yet scarcely any traffic, local or through.

WARMING RAILROAD CARS.

Every railroad accident which occurs, in which any persons are burned up, is sure to be followed by all kinds of suggestions for the heating of cars without the use of fire in each one of them. A certain peculiar kind of people then blossom out in the daily papers with suggestions for remedying the evil and dark hints about the depravity and malevolence of railroad managers who will not see the merits of their inventions. Car-builders and superintendents are quite familiar with most of the plans for heating cars which this class of people propose. There is the stereotyped one of using steam from the locomotive, and it is next to impossible to make those who suggest it comprehend that a locomotive—especially in cold weather with a heavy train, which would then require a great deal of steam to heat it—has no steam to spare, and that the great difficulty is to generate enough to draw the train. The fact that the size and weight of a locomotive boiler are limited, and that its steam-generating capacity is dependent upon its dimensions, is one which somehow many people have great difficulty in grasping. To the objection pointed out this kind of inventor usually has a ready answer in the proposal to use the exhaust steam, and exhibits an irritating ignorance of the fact that it has any relation to the generation of live steam. If you point out to him that when a train is running down grade, or is standing still, there will be no exhaust, he will smile and say that then the engine can spare enough live steam for heating. The difficulty of regulating the heat, of getting any hose or couplings for conveying the steam from one car to another to stand, the trouble from these parts freezing up are all trifles to our sanguine friends, who wave their hands and answer these are only matters of administration. This picture will, it is believed, be recognized as a true one by nearly every railroad superintendent who reads it.

It would, of course, be folly to say that no system of steam heating of cars can ever succeed. Such a method is now employed on the elevated railroads in New York, but it can hardly be said that its success is beyond question. The experiment has been made of supplying steam from a stationary boiler in the baggage car. This, of course, overcomes the difficulty of the supply of steam from the locomotive. The plan, though, has not so far proved a success. It is expensive, and the hose which convey the steam from one car to another are difficult to maintain and to couple and uncouple in making up trains.

Professor Wells, of the Boston Institute of Technology, has invented a plan for heating cars, which the *Transcript* of that city describes as follows:

"The apparatus consists merely of an iron cylinder filled with water, and having at one end a fixed plate of hardened iron. Pressing against this plate is a movable iron disk connected with a revolving shaft. When power is applied the friction between the plates generates heat, which is transmitted to the water in the cylinder, the heated water being carried through the car in pipes. The advantages claimed for the invention are its compactness, cheapness, and absolute safety from fire. In its application to railroads, each car could be heated independently, as the machine can be connected with and derive its power from the axle. But admitting all that is claimed for the invention, there still remains the objection that the cars cannot be warmed before the train starts, and also that in severe weather they would become cold during long waits, not infrequent at such times."

It would not be amiss, perhaps, to advise Professor Wells to get a little experience as a locomotive runner with heavy and fast trains. If he did, he would probably very soon abandon his invention, as a series of 'movable iron disks" whose friction would be sufficient to develop enough heat to warm a train would probably be a very effectual brake to it.

It is a little surprising that it has never been proposed either to have a fuel gas generator in some part of the train, and convey the gas and burn it in each of the cars, or else to store such gas, by compression, in tanks under each car.

The traveling public and railroad men are of course familiar with the various kinds of stoves now in use. Baker's system of hot-water heating is found in nearly all drawing-room, sleeping and the better class of passenger cars. Spear's and other methods of warming by convection, or the introduction of fresh warmed air, the plan in use on the Reading Railroad, where

the stove is placed below the floor of the car, and the latter warmed by a supply of heated air, Winslow's and other stoves, which have a tank of water below, so that if the car is overturned the water will extinguish the fire, and a multitude of other forms of stoves which heat by direct radiation, are well known. Besides these plans, it has been proposed a great many times to make passenger cars of iron, so that they would not take fire. To this there are some serious objections. In the first place an iron car would be very hot in summer, cold in winter, and noisy at all times, unless some non-conducting substance was employed in its construction. It would also be extremely difficult to extricate passengers from a wrecked car in case of accident. In such a case it would be impossible to cut away the wreck with an axe or a saw, and with any tools it would take a long time to do so.

All, or nearly all, these difficulties have been considered a great many times by railroad managers, superintendents and car-builders. Nevertheless, the urgency of making cars safer from fire in case of accident is very great, as any one must have realized who read the reports of the horrors of the Spuyten Duyvil and other similar accidents. The mere contemplation of the horrible incidents attending such calamities are so appalling and sickening that a sensitive person instinctively tries not to think of them. If any one who has any influence in determining what appliances shall be used in heating cars will for a moment conceive of the agony those must suffer who are crushed among the splintered timbers, and are thus inextricably held and burned to death, it seems as though he must be inclined to give it the most prompt and earnest attention. Doubtless there are many humane railroad officers who have been earnestly turning over the question in their own minds of what means should be adopted to obviate the danger from fire in case of accidents.

In our climate, and with the length of the journeys which must be made here, it is impracticable not to heat the cars. If it were not done, many more persons would suffer and die from exposure to cold and consequent disease than are now killed and injured by fire. The cars must be heated, there can be no question of that. How, then, shall it be done with the least risk?

In a great many cases it happens that while the solution of a question of this kind is a very simple one and lies close at hand, it is neither observed nor adopted, because so many other much more complicated and pretentious methods are proposed for meeting the difficulty. This seems now to be the case in the matter of block signals. The essential element of this system is that a telegraph operator shall not allow a train to pass his station until the operator at the station next beyond, in the direction the train is running, has telegraphed him that the preceding train has passed the latter station. It is not very important what kind of instruments are used or signals employed in communicating the information from one telegraph operator to another, and by them to the locomotive runners. Ordinary telegraph instruments, red and white flags and lanterns will answer very well. Notwithstanding this, we are now having, and are likely to continue to have, a deluge of divers electric, dynamic, pneumatic, hydraulic and automatic devices to obviate incidental difficulties which are by no means vital, and the solution of which may be put off for years longer. It is not said that some of the proposed devices and instruments may not be useful, or that the difficulties which they propose to obviate have not importance. What is said, though, is that most of the difficulties are incidental. The essential truth, at the present time, in this connection, is the impossibility, as has been pointed out in these pages before, of having the rear of delayed trains protected with reasonable certainty by brakemen going back. On the other hand, telegraph operators are comfortably housed, and have no motive to disobey or neglect orders. They can, therefore, be relied upon to protect delayed trains much more implicitly than brakemen can be.

The problem of ventilation of cars is another instance. The various complicated forms of hoods, pipes, deflectors, valves, sieves, etc., etc., would drive a person almost distracted to comprehend them, whereas the simple device of a register of adequate size over the two end windows has practically solved the whole difficulty.

Now we are inclined to believe that the problem of warming cars with safety will be solved in some analogous way. As a matter of fact what we have to do in a car is to provide a receptacle which will hold a bushel or half bushel of incandescent coals, and which will not scatter that coal in case the car is crushed, or set fire to anything about it should the objects by which it is surrounded come in contact with the receptacle. Obviously, if we want to prevent the coals from being scattered we ought not to put them in a vessel which will be knocked to pieces by any severe shock. Nevertheless, this is precisely what is done in the great majority of cars which are now running. Let us imagine that any ordinary car stove was filled with a glowing fire and that it was placed immediately in front of the drawbar of a car which is standing still. Suppose now that we allowed another car to run down an incline so as to come into more or less violent collision with the stove and the first car, what would then become of the fire in the stove? All who are familiar with the construction of ordinary car stoves will probably agree in thinking that it would be scattered in every direction. Supposing now that the fire was contained in a cylindrical stove made of say sheet copper an eighth of an inch thick, securely riveted together, and the same experiment was made. The probability, or almost certainty is, that in the latter case the stove would be crushed without scattering the fire. As copper is expensive, and as steel plates are now made so as to be very ductile, the latter might be used for making stoves instead of the former. The aperture could be protected with wire cloth and the whole could be securely bolted to the floor. To prevent the parts from taking fire which would come in contact with it in case of a collision, the stove might be enclosed in a chamber also made of steel plates, which would serve the useful purpose of protecting the woodwork and paint from the effects of the heat. The stoves could be made of the simplest form, that of a vertical cylinder for coal, and a horizontal cylinder for wood. If placed below the floor of the car, it would of course add to the security, but some complication of pipes and valves is then required to make it an effectual heater.

A cylindrical stove with an end ventilator, already referred to, would reduce the warming and ventilating appliances to the simplest form now in use, and the cost would only be increased by the difference between steel and cast-iron plates and whatever additional workmanship that substitution may imply. It seems as though the manufacture of such stoves would offer an inviting field for some enterprising manufacturing firm to occupy. Stoves of this kind could be made in the shops of any railroad company, and would require no special skill—excepting, perhaps, to design some effective door fastenings.

PENNSYLVANIA RAILROAD EARNINGS AND EXPENSES.

Pennsylvania Railroad earnings in December, on all lines east of Pittsburgh and Erie, were $183,983, or 5.2 per cent., more in 1881 than in 1880; the expenses were $106,984, or 4.4 per cent., greater, leaving an increase in net earnings of $76,999, or 6.8 per cent. For 9 successive years gross and net earnings and expenses in December have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1873	$2.958,768	$1,925,991	$1,032,777
1874	3,087,115	1,838,496	1,248,619
1875	2,801,171	1,521,555	1,279,616
1876	3.082,567	1,710,408	1,372,159
1877	2,841,392	1,641,786	1,199,606
1878	2,605,,97	1,673,363	931,934
1879	3.453.924	1,941,870	1,512,054
1880	3.547,828	2,421,576	1,126,252
1881	3,731,820	2,528,569	1,203,251

The most notable feature of this table is the great increase of expenses since 1879; they are $691,000 (46 per cent.) larger than then, though the gross earnings are but $278,000 (8 per cent.) larger. Moreover, these December expenses are larger than those of the previous months, and much above the average monthly expenses of the year (which were $2,225,817). Indeed, they were the largest expenses the road has ever had in any one month with the exceptions of May and June, 1873. For four years now the largest month's expenses on this road have been in December, but in the four years ending with 1877 the December expenses were considerably below the average of the year. The net earnings last December, though larger than in 1880, were a fifth smaller than in 1879, and smaller than in 1874, 1875 and 1876. They were even a little less than the average December net earnings of the eight preceding years, although these years cover the whole of the period of stagnation in business, which so greatly reduced the profits of railroads.

For the whole year 1881 there was an increase of $2,864,110 (7 per cent.) in gross earnings, of $2,084,762 (8¼ per cent.) in expenses, and of $779,348 (4¾ per cent.) in net earnings. Nearly three-fourths of the large increase in earnings was thus absorbed by the increased expenses, which rose from 59.7 per cent. of the earnings in 1880 to 60.5 in 1881. This is probably to be accounted for by the carriage of a larger traffic at lower rates than in 1880, and the expense per unit of traffic may not have been greater last year than in 1880, though everything, almost, has cost more.

For the whole year the gross and net earnings and expenses have been, for nine successive years:

Year.	Miles worked.	Gross earnings.	Expenses.	Net earnings.
1873	1,530	$39,983,139	$26,783,587	$13,199,552
1874	1,538	37,386,427	23,011,749	14,374,678
1875	1.566	34,464,104	21,094,461	13,369,643
1876	1,624	36,891,061	22,081,229	14,809,832
1877	1,716	31,117,146	19,028,467	12,088,679
1878	1,716	31,636,734	18,468,993	13 167,741
1879	1.806	34,620,279	20,382,749	14,237,539
1880	1,810	41,260,072	24,625,047	16,635,025
1881	1,845	44,124,182	26,709,809	17,414,373

The increase of gross earnings since 1877, the year when earnings were smallest on a large proportion of the railroads of this country, is no less than $13,007,036, or 41.8 per cent. Expenses were least in 1878, and since then there has been an increase in these of $8,240,816, or 44.6 per cent., and since 1877 there has been an increase of $5,325,649, or 44.1 per cent., in net earnings—the *increase* in net earnings alone being nearly 8 per cent. on the stock.

There is, however, a serious check last year to the increase in profits. From year to year this increase has been, since they were least:

1877 to 1878	$1.079,062
1878 to 1879	1,069,798
1879 to 1880	2 397.466
1880 to 1881	779,348

All this is sufficiently accounted for by the six months of railroad war which destroyed the value of nearly all this company's large through traffic during that time, while poor crops in the Western territory which it especially serves probably actually reduced its east-bound through traffic in the last five or six months of the year, in spite of the unprofitably low rates. The gross and net earnings must have been some millions of dollars greater but for this war. We may get some idea of the effect of this (and of other causes which distinguished the last half of the year) by comparing the gross and net earnings and expenses in the last half with those of the first part of the year, which we do below:

Gross earnings:	1877.	1878.	1879.	1880.	1881.
1st half	$14,336,996	$14,451,933	$15,414,058	$19,434,071	$21,553,329
2d half	16,780,750	17,184,796	19,206,221	21,826,001	22,570,343
P. c. in 2d half	54.0	56.6	55.5	52.9	51.1

Never before was there so small a proportion of the year's earnings in the fall half. In 1881 there was an increase of $2,864,110 over 1880; but the increase was only $744,342, or 3.4 per cent., in the last half of the year, while it was $2,119,768, or 10.9 per cent., in the first half of the year.

Next let us examine the course of the expenses:

Expenses:	1877.	1878.	1879.	1880.	1881.
1st half	$9,6 6,977	$9,106,040	$9,568,403	$11,339,662	$12,556,685
2d half	9,421,490	9,362,953	11,814,337	13,285,385	14,153,124
P. c in 2d half	49.5	5 .7	58.0	54.0	53.0

There is nothing particularly noticeable about the division of the expenses in the two halves of the year, unless it is that the very severe weather last winter might have been expected to bring a larger percentage of them into the first half. We will now examine the net earnings in the same way:

Net earnings.	1877.	1878.	1879.	1880.	1881.
1st half	$4.720,419	$5,245,898	$5,845,655	$8,094,409	$8,997,154
2d half	7,359,260	7,821,843	8,391,884	8,545,616	8,417,219
P. c. in 2d half	60.9	59.4	59.0	51.4	48.3

This, of course, is the resultant of the other two—the receipts and expenses—but as the earnings showed less than their usual increase in the last half-year and the expenses grew as fast as ever, the change in the net earnings is more marked than in receipts or expenses. Never before (in these five years) have the profits of the last half been less than those of the first half of the year. In 1880 they were $451,000 greater in the last half; in 1881 they were $580,000 less, and in years previous to 1880 the difference in favor of the last half was much greater than in 1880, even; in all three of them there having been as much as $2,500,000 more profit in the last than in the first half of the year.

The railroad wars account for this in every year except 1877, and partly account for that year also. But in 1877 there was very little to carry in the first half of the year. In the last half there was a heavy grain movement at good rates; and the last half of 1877 was the first half-year of the New York pool. But in 1878 and 1879 east-bound through rates were badly demoralized in the first half of the year, making the earnings and profits then abnormally small. In 1880 rates were well maintained and traffic was heavy both halves of the year. In 1881 we have the opposite of the conditions in 1878 and 1879—that is, rates were pretty well maintained in the first half of the year and utterly bad in the last half; and as local traffic was heavy all the time, this was probably the chief cause of the comparatively small net earnings of the last half. They were then, we see, actually smaller than in 1880. At the end of last June the Pennsylvania Railroad had made $902,745 more profits than the year before; at the end of December this increase was reduced to $779,348. And the net earnings of the last half of 1881 were not only less than in 1880, but they

were scarcely any greater than in 1879, while in the first half of 1881 they were $3,151,499 (54 per cent.) more than in that year.

But this does not show the whole effect of the railroad war on the Pennsylvania Railroad Company. It has the gains and losses of its great system of leased and controlled lines west of Pittsburgh and Erie. Now for the whole year 1881 the surplus of net earnings over liabilities earned by this Western system was $358,900 less than the year before; while at the close of the first half of the year this surplus was $284,676 *more* than in 1880. We have thus a *decrease* in the surplus profits of this system in the last half of the year amounting to $643,576, and this makes the company's profits from its whole system in the last half of 1881 $771,973 less than in 1880; while in the first half it was $1,187,421 greater in spite of the terrible winter. The increase for the first half of the year was equivalent to about 1.7 per cent. on the company's stock; for the whole year it is but about 0.6 per cent. (In 1880 the company's profits over interest, rentals and other fixed charges were 11.9 per cent. on its stock; but the stock has been increased by one-eighth since).

The report of this road covers a period of railroad war more than twice as great as that included in the annual reports of the three other trunk lines. The Pennsylvania is in some respects different from all of them; its system is much larger, and it profits vastly more by the unprecedented activity in the iron manufactures, a very large portion of which are directly upon its lines and receive their raw materials and ship their products by it. Everything was favorable to its local traffic last year. This was true also of nearly all Eastern railroads; but the industries on the Pennsylvania were not only more active than most other manufacturing industries, but they involve a very much larger amount of transportation than most others. It should have had much greater local earnings and profits in 1881 than in 1880; and we may be sure that it was this traffic which saved it from a large decrease in profits.

The Late Alexander Lyman Holley.

Alexander Lyman Holley died at his residence, No. 89 Joralemon street, Brooklyn, on the evening of Jan. 29. The immediate cause of his death was peritonitis due to a complication of diseases. The funeral services were held at Plymouth Church on Wednesday, Feb. 1, and were conducted by Rev. Henry Ward Beecher, of whose church Mr. Holley was an attendant. Many of the members of the American Institute of Mining Engineers, of the Society of Civil Engineers and of the Society of Mechanical Engineers attended the services.

Mr. Holley was born in Lakeville, Conn., Jan. 20, 1832. His father, who is still living, was at one time Governor of Connecticut. He graduated from Brown University in 1850 and was afterwards employed for some time at the Corliss Engine works, in Providence, and on leaving there he ran a locomotive for about a year on the Stonington Railroad. In April, 1856, he became the editor and proprietor of Colburn's *Railway Advocate*, which had been started by the brilliant but erratic Zerah Colburn. In August, 1856, the name of the paper was changed to Holley's *Railroad Advocate*. In July, 1857, Holley and Colburn associated themselves together in the publication of this paper, but at the same time changed its name to the *American Engineer*. It was, however, very short-lived, and went down with so many other projects in 1857.

The same year the two were sent to Europe by a number of American railroad companies to make an investigation and report on British railroads. The results of their observations were published in 1858 in a volume with the title: "The Permanent-Way and Coal-Burning Boilers of European Railways, with a Comparison of the Working Economy of European and American Lines and the Principles upon which Improvement must Proceed, by Zerah Colburn and A. L. Holley." In the preface it is said: "The substance of this work was first undertaken as a private report to a few railway companies. On its completion the authors were requested to publish it. After deciding upon this step they took occasion to rewrite and extend the manuscript portion with a design of making the whole in its present form more generally useful."

While in Europe and afterward, Mr. Holley contributed a series of letters on engineering subjects to the New York *Times*, over the signature of "Tubal Cain." He returned to this country on the first transatlantic voyage of the "Great Eastern," and then predicted that screw steamships would displace side-wheel vessels. While in England he became acquainted with Brunel and Scott Russell, and was intimate with the latter to the end of his life. He studied thoroughly the construction and sea-going qualities of the Great Eastern vessel, and afterward was employed by Edwin Stevens as Consulting Engineer in the construction of the Stevens battery.

In 1860 he prepared a second edition, very much enlarged, of the original work on European railways, with the title, "American and European Railway Practice in the Economical Generation of Steam; Including the Materials and Construction of Coal-burning Boilers, Combustion, the Variable Blast, Vaporization, Circulation, Superheating, Supplying and Heating Feed-water, etc., and the Adaptation of Wood and Coke-burning Engines to Coal-burning, and in Permanent Way, including Road-bed, Sleepers, the Rails, Joint-fastenings, Street railways, etc., etc." About the same time he prepared many of the illustrations of engineering and mechanical subjects for Webster's Dictionary (the edition of 1864).

He went to Europe again in 1862 for the purpose of investigating and studying the Bessemer process of manufacturing steel and the latest improvements in offensive and defensive warfare. He then purchased the Bessemer patents for Mr. John A. Griswold and some other steel manufacturers, who afterwards organized as the Bessemer Steel Association. On his return, which was during our war when there was great interest felt in guns and defensive armor, he wrote "A Treatise on Ordnance and Armor," which has been recognized as one of the standard authorities on that subject. Frequent orders for it have been received by the American publishers from the British government as well as our own Ordnance Department.

On the organization of the Bessemer Steel Association Mr. Holley became its Consulting Engineer and remained so until his death. He designed and superintended the construction of the works at Troy, Harrisburg, Chicago, Joliet and Pittsburgh. He himself took out numerous patents for improvements in steel manufacture. He visited Europe once or twice each year to collect information for his clients regarding the latest improvements in steel manufacture. The results of his observations and investigations were published in numerous pamphlets, which were circulated as confidential reports to the members of the Association by which he was employed. These reports have very great value, and it is hoped that they may ultimately be made public.

In 1869 he was for a time editor of Van Nostrand's *Eclectic Engineering Magazine*, which was started at his suggestion. The translation of Tunner's "Roll Turning," Grüner's "Manufacture of Steel" and Barba "On the Use of Steel" originated in the same way.

In 1875 Mr. Holley was elected President of the Institute of Mining Engineers. He was at one time Vice-President of the Society of Civil Engineers and was one of the founders and Vice-President of the Society of Mechanical Engineers. He was recognized as the foremost expert in this country in the manufacture of steel, and it was in a great measure through his efforts that such gigantic strides have been made in this art in this country.

In the many papers, addresses and communications of various kinds of which he was the author, he displayed not only a complete mastery of the subjects which he treated, but also a most felicitous style combined with so much wit and humor that the dryest subject in his hands never failed to be interesting. Those who heard him read his paper on "Standard Rail Sections" at Philadelphia a year or two ago will never forget the strain of gentle ridicule with which he made some of the efforts of ambitious engineers appear absurd.

He was fond of society, of art and of his profession; he was a friend who was universally esteemed, an engineer whose opinion was always valued, and a man whose place cannot easily be filled.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Chicago, Burlington & Quincy.—The *Denver Extension* has reached a point one hundred and thirty-five miles west of Culbertson, Neb., an extension of 25 miles.

Galveston, Harrisburg & San Antonio.—The *El Paso Division* is extended eastward to Marfa, Tex., 21 miles.

Missouri Pacific.—The *Jefferson City, Lebanon & Southwestern Branch* is extended southwest to Little Gravois, Mo., 14 miles.

Port Huron & Northwestern.—The *East Saginaw Branch* is extended to East Saginaw, Mich., 10 miles. Gauge, 3 ft.

St Louis, Iron Mountain & Southern.—Track is laid on the *Arkansas Branch* from Knobel, Ark., south to Gainsville, 10 miles.

St. Louis, Jerseyville & Springfield.—Extended from Jersey Landing, Ill., to Grafton, 3 miles.

Western North Carolina.—Track on the *Ducktown Branch* is extended southward to Pigeon River, N. C., 16 miles.

This is a total of 99 miles of new railroad, making 138 miles thus far reported for 1882, against 71 miles reported at the corresponding time last year.

THE ST. LOUIS & SAN FRANCISCO RAILROAD comes under the control of Messrs. Jay Gould and C. P. Huntington, who have bought a majority of the shares in the company. This may have a very considerable effect on railroad business and railroad construction in the far West. The St. Louis & San Francisco was the only road from St. Louis west not under the control of the Gould interest, and it is surrounded on all sides by other lines of the Gould Southwestern system, the Missouri Pacific and the Missouri, Kansas & Texas on the north, the latter also on the west, and the Iron Mountain on the south. Their competition with each other for local traffic is insignificant, railroads not being very close together south of the Missouri; but the St. Louis & San Francisco could not afford to go without a share of the Texas traffic, and has been constructing a line to enable it to reach it, and for this it would compete with the Iron Mountain and the Missouri, Kansas & Texas. Further, it affords the shortest St. Louis connection for the part of the latter road south of Kansas, and can very conveniently be worked in connection with it. It always entered St Louis over the Missouri Pacific, which it joins 37 miles from St. Louis; but it has done much work on an independent entrance. From St. Louis to Vinita, the point where the St. Louis & San Francisco joins the Missouri, Kansas & Texas, is 401 miles by the Missouri Pacific and 364 by the St. Louis & San Francisco. From St. Louis to the Texas Pacific at Fort Worth is 692 by the St. Louis & San Francisco and Missouri, Kansas & Texas and 743 miles by the Iron Mountain. To Chicago the shortest route to Fort Worth includes only the Missouri, Kansas & Texas of these three roads, the distance by it being 945 miles, against 972 miles by the St. Louis & San Francisco and the Iron Mountain.

The effect of the purchase on connections with the Pacific, however, will probably attract most attention. The St. Louis & San Francisco owns one-half of the stock of the Atlantic & Pacific, and in connection with the Atchison, Topeka & Santa Fe, which owns the other half, is building that road across New Mexico, Arizona and California to San Francisco. There is a contract between the two companies intended to secure each an equal share of the traffic over this line, and also a contract by which the St. Louis & San Francisco part of the traffic, until its own line is completed across the Indian Territory to Albuquerque, will be carried over the Atchison, Topeka & Santa Fe to its junction with the Kansas Division of the St Louis & San Francisco at Wichita, 508 miles from St. Louis. Now it is natural to suppose that Mr. Huntington's interest in the scheme will be exerted to prevent its extension further west in California than to the line of the Southern Pacific, which it would strike as much as 400 miles from San Francisco; and Mr. Gould will probably desire it to be so managed as to do the least possible damage to the Texas & Pacific, which receives its traffic from the Southern Pacific.

But, in considering this subject, most people place altogether too much stress on the through traffic. It should be remembered that there is not much of it, and that the share of the Atlantic & Pacific must be quite small, as that of the Southern Pacific and the Atchison, Topeka & Santa Fe now is really insignificant. The road must be supported by the traffic along its line, and for this it will not have to compete with any other road. If it were extended to San Francisco it would have to compete for nearly all its California traffic with the Southern or Central Pacific.

If any one is hurt by the new arrangement it is apparently the Atchison, Topeka & Santa Fe. However, changes in ownership of stock do not enable a corporation to abrogate a contract, as some people seem to think. Whatever the St. Louis & San Francisco agreed to do last year it is bound to do now just the same.

THE NORTHERN CENTRAL RAILWAY is a more important line than most people think. It seems to be looked upon as a sort of necessary evil to the Pennsylvania Railroad, enabling it to do a little Baltimore business. But actually, as we have shown before, the Northern Central brought more grain to Baltimore than the Baltimore & Ohio itself last year; and it also carries much anthracite coal to that city. Its earnings last year were at the rate of $16,699 per mile of road, against $15,019 on the "main stem and branches of the Baltimore & Ohio." The Northern Central, however, is nearly all main line, while more than a quarter of the Baltimore & Ohio is branches. The Northern Central's earnings have increased largely within a few years—10 per cent. from 1878 to 1879, 23 per cent. from 1879 to 1880 and 7½ per cent. from 1880 to 1881, making 46 per cent since 1879. This was done without a proportional increase in expenses until last year, when the expenses were 45½ per cent. more than in 1878, and when the increase of expenses since 1880 was $138,865 more than the increase in earnings Gross and net earnings and expenses for eight successive years have been:

	Gross earnings.	Expenses.	Net earnings.
1874	$4,676,501	$3,383,554	$1,292,947
1875	4,926,248	3,362,124	1,464,124
1876	4,369,926	3,242,326	1,127,600
1877	4,070,388	2,745,925	1,324,463
1878	3,723,457	2,604,497	1,118,960
1879	4,107,949	2,861,942	1,246,007
1880	5,050,387	3,255,268	1,795,119
1881	5,433,700	3,787,446	1,656,254

This road gets a comparatively short haul (85 miles) on its Baltimore through freight interchanged with the Pennsylvania Railroad, while that interchanged with the New York Central goes over the whole length of the road. We should not expect it to be so much affected by the railroad war as the Pennsylvania or the Baltimore & Ohio. In fact, while its gross receipts were well maintained after the railroad war broke out, its net earnings fell off enormously. In the first half of the year 1881 these net earnings had averaged $173,400 per month, and in June were $181,690, but these fell in July to $63,233, and for four months ending with October averaged but $72,090, rising, however, to $173,457 and $154,990 in the last two months of the year, when through traffic was probably least profitable.

The profits, however, have been more affected by the expenses than by the receipts, and the expenses have taken a more remarkable course than the earnings in the last half of the year. Below we compare gross and net earnings and expenses in the two halves of the year:

	1881.	1880.	Inc. or Dec.	P. c.
Gross earnings:				
First half	$2,661,868	$2,215,791	I. $446,077	20.1
2d half	2,781,832	2,834,596	D. 52,764	1.9
P. c. 2d half	51.1	56.1	.....	....
Expenses:				
First half	1,621,406	1,527,077	I. 94,329	6.2
2d half	2,165,040	1,728,192	I. 436,848	25.4
P. c. 2d half	57.2	53.3	.....	....
Net earnings:				
First half	1,040,462	687,714	I. 352,748	51.3
2d half	615,792	1,106,404	D. 490,612	44.4
P. c. 2d half	37.3	61.6	.....	....

In the first half of 1881 there was an increase of $446,000

in the gross earnings of the Northern Central road, while the expenses increased but $94,000, and the increase in net earnings was nearly $353,000, which was more than 50 per cent. The *increase* in that one half year was equal to 6 per cent. on the stock, and the property seemed a very promising one. But the second half of the year shows an astonishing reverse, not so much by a decrease of earnings, which was but $53,000 (2 per cent.), as by the enormous increase of $437,000 (25 per cent.) in expenses, resulting in a *decrease* of $490,600 (44 per cent.) in the net earnings of the last half year, which is 8⅜ per cent. on the company's stock. Such a tremendous change from one half year to the next is not often seen; but only a small part of it can be due to the railroad war. The through traffic in the last half of the year cannot have been much larger in 1881 than in 1880, and the great increase in expenses was probably due to some extraordinary expenditures in that half-year.

This company, apparently, is capable of earning very large dividends on its small capital; but it has never paid large ones—3½ per cent. in 1874, 3 in 1876, 2½ in 1880, and 6 in 1881. The surplus in 1880, after paying 2½ per cent., was equal to more than 8 per cent. on the stock. More than two-fifths of the stock is owned by the Pennsylvania Railroad Company, which also owns $1,000,000 of its second-mortgage bonds.

A MICHIGAN PENINSULA CANAL is proposed to the attention of Congress as a proper work to be constructed at the expense of the nation. One proposal is to construct it from the southern end of Lake Michigan to Toledo, and the other on a line opposite Chicago, at Saugatuck, to Detroit. There is probably hardly another place in the United States where a canal is less needed. Any one who has compared the lake rates from Chicago to Buffalo with those from Detroit or Toledo to Buffalo knows that the through shipments would not go by canal. Already the cost of transportation between Chicago and Buffalo is marvellously cheap, and from Detroit it is usually only about a cent a bushel less, and frequently the rate from Detroit is nearly the same as from Chicago. Yet Detroit is three-fourths of the distance from Chicago to Buffalo. Such proposals must come from men who know nothing of the lake rates. Seeing the great oxbow made by the lakes from Chicago to Toledo, with a distance of nearly 700 miles, against 250 straight across (but probably 300 by a canal), they jump at the conclusion that the reduction of the distance will greatly decrease the expense. A vast amount of grain has been carried from Chicago to Buffalo for 1½ to 2 cents a bushel. It is not worth while to try to reduce the cost below that. When the rate on the Erie Canal falls as low as 4 cents a bushel from Buffalo to New York, 500 miles, most of the boats abandon the grain trade as unprofitable; but probably four-fifths of their expense is on the 350 miles from Buffalo to Troy, a distance not much greater than from Lake Michigan to Toledo. But canal boats would have to pay the cost of transfer at Lake Erie in addition to the vessel charge on Lake Erie before they could compete with the through lake vessels, and in spite of the shortness of their route the lake vessels would beat them in time by several days. The only way by which the government can cheapen transportation between Chicago and Buffalo is by improving the harbors and the channels at difficult places, such as the St. Clair flats and the "Lime Kilns" below Detroit, and so permit the passage of larger vessels and lessen the dangers and delays. The lakes form probably the most important single internal transportation route in the country or in the world, and to improve it by cutting a canal across the Michigan peninsula is like improving a railroad by building a wagon road across one of its curves. The Hennepin canal scheme, which is a very doubtful one, has a thousand times the merit of this for a "lake cut-off."

CHICAGO SHIPMENTS EASTWARD continue extraordinarily large. For the week ending Jan. 21 for three successive years they have been:

	1880.	1881.	1882.
Tons	36,654	60,317	77,679

Here we have an increase of 29 per cent. over last year, and of 112 per cent. over 1880. The receipts this year are 10 per cent. more than the week before, and were exceeded but once in 1881 (the first week of the railroad war), and once in 1880.

Of the shipments for the week this year the Chicago & Grand Trunk carried 8 per cent., the Michigan Central 31.4, the Lake Shore 26, the Fort Wayne 20.2, the Pan-handle 11.6 and the Baltimore & Ohio 2.8 per cent. The two Vanderbilt roads are far ahead, the two Pennsylvania roads but little below their old pool percentages. For the three weeks ending Jan. 21 the Chicago shipments have been:

	1880.	1881.	1882.
Tons	108,063	187,330	203,592

The average weekly shipments in the first quarter of the year were 50,518 tons in 1879, 49,916 in 1880 and 52,906 in 1881. There has never before been such a winter business as this year so far.

For the week ending Jan. 28 the Chicago Board of Trade reports the shipments billed from Chicago to have been 66,296 tons, against 60,753 tons the previous week and 54,689 in the corresponding week of last year, indicating a larger total movement than the week before even. This week was the first of the advanced rate, but probably the shipments were chiefly on contracts for quantities at the old rates, and it is probable that the extraordinary shipments of the month have been due to the limitation in time of such contracts and to the expectation that rates would soon be advanced. To get the benefit of their contracts the shippers have to hurry forward their freight. The receipts at Chicago, however, are also extraordinary, and largely exceed the shipments; but these too may be stimulated by the contract and the effort of the shippers to get freight enough to fill them.

For the week ending Jan. 28, 10,044 tons of the shipments were flour and 41,466 grain. The provision shipments were not extraordinary; 61.4 per cent. of the flour and 60.4 per cent. of the grain went by the Vanderbilt roads, and 38 per cent. of the provisions; 24.4 per cent. of the grain and flour and 52.6 per cent. of the provisions by the Pennsylvania roads. More than 20 per cent. of the flour went by the Pan-handle, however—nearly three times as much as by the Fort Wayne.

It is understood that the Pennsylvania has made no contracts; but the Erie, whose freight lines enter Chicago over the Pennsylvania's roads, probably has.

BRITISH RAIL EXPORTS TO THE UNITED STATES were somewhat larger in December last than the month before, but much smaller than in any previous month since February, and 22½ per cent. greater than in December in 1880. The exports of iron rails were the smallest of any month for two years. For the whole year the British rail exports to the United States were 291,632 tons in 1881, which is 33 per cent. more than in 1880 and 553 per cent. more than in 1879. For several years we imported scarcely any rails until the latter part of 1879—in the whole year 1878 only 681 tons. The British exports to this country were sufficient for less than 8 miles of track laid with 56 lbs. rails in that year, but were enough for 507 miles in 1879, for 2,483 in 1880, and for 3,314 in 1881. Nearly 45 per cent. of the exports to this country were iron in 1880, but not one-third of them in 1881. Yet of the total iron rail exports of Great Britain last year four-fifths went to this country—only 23,347 tons to all other countries. About one-third of the exports of steel were to this country.

The total British exports of rails last year were 18.2 per cent. more than in 1880 and 84 per cent. more than in 1879. But by far the larger part of the increase is due to the demand from this country. There has been some revival of railroad construction elsewhere, but it has been comparatively slight. The total British exports to all countries except the United States were 342,580 tons in 1879, 384,815 in 1880 and 422,473 in 1881. British North America comes next to the United States as a customer of Great Britain in 1881, but British India was second in 1880. The British colonies together took 237,889 tons in 1881, against our 291,632, and these English-speaking countries together took 74 per cent. of the total British exports. In 1881 "other countries" are credited with an exceptionally large amount —95,228 tons, and 13⅛ per cent. of the whole. The increase is probably partly due to exports to Mexico. European countries took very few British rails last year—together only 54,084 tons, nearly half of which went to Italy. Russia, which is sometimes a good consumer, was too poor to buy rails, and Germany, Belgium and France made their own, and the first two countries some for export also.

The report of the value of steel rails exported indicates an average value of $28.42 per ton in 1879, rising to $34.75 in 1880, and falling to $32.42 in 1881. The average value of the iron rails exported last year was $28.91—only $3.41 less than that of the steel rails. The difference in price in this country is usually about $12.

TRUNK LINE SHIPMENTS EAST took an unusual course last year. They were greatly stimulated in the last half of the year by the low rates of the railroad war; but the effect of low rates, it must be remembered, is not to create traffic, but to divert it from one route to another. There was no more grain, provisions and stock to send to market when the rates were made low than if they had been high; but much of the grain and flour that otherwise would have gone to the East by the lakes and the canal was attracted to the railroads by their low charges. But there could be no such diversion, of course, when there was no water route; and so while the rail shipments of lake ports were much larger in the last half of 1881 than in the corresponding period in 1880, in spite of a large decrease in total shipments, at interior towns there was generally a decrease in shipments. Announcement has recently been made of the shipments from Indianapolis for the last three years, which it will be interesting to compare with the Chicago shipments, as below:

	1879.	1880.	1881.
Indianapolis	595,000	710,000	522,261
Chicago	2,471,738	2,309,640	2,889,317

Thus, compared with 1880, the shipments from Indianapolis fell off last year 187,739 tons, or 26.4 per cent., while the Chicago shipments *increased* 579,677 tons, or 25.1 per cent., and compared with 1879 even there is a decrease of 12¼ per cent. at Indianapolis against an increase of 17 per cent. at Chicago. There was less than the usual amount of freight in the country that ships by way of Indianapolis, and there freight could not be diverted from water routes; but the low rail rates at Chicago simply transferred many millions of bushels of grain from the lake vessels to the railroads, so that these latter, even in the last half of the year, when the total grain shipments (which alone are diverted from the vessels) were 15 per cent. less than in 1880, carried 1,519,781 tons in 1881, against 1,125,061 in 1880—an increase of 394,720 tons, or no less than 35 per cent.

We have no definite information of the total east-bound shipments in 1881, but in spite of the very large increase from Chicago, it is doubtful if they were as large as in 1880, due to the smaller supplies of grain, which affected the traffic in the last half of the year especially. But for that, doubtless, the shipments, at the rates that were charged, would have been enormously greater than ever before; but it would probably have been almost impossible to keep rates down under such circumstances, as the equipment would not have been sufficient for the traffic.

THE TERMS OF SETTLEMENT OF THE RAILROAD WAR are reached only after much negotiation, but the negotiations are progressing very industriously. There have been meetings at Mr. Fink's office every day for a week, and there must be a great many more. So far we understand that the passenger business has received most attention, and the negotiating parties have been chiefly the general passenger agents, the traffic managers and the vice-presidents. All the work is preliminary to a division of the traffic, or, in the case of passengers, of the earnings from the traffic.

After the meeting Wednesday it was announced that a resolution had been agreed upon, establishing the basis for through passenger rates. The New York–Chicago rate is to be $20 for limited and $23.25 for unlimited tickets *except by the Pennsylvania and the Baltimore & Ohio*, whose unlimited tickets are to cost $3.25 more. The unlimited rates are made by the sum of the locals, and this is less by way of Buffalo than by way of Pittsburgh. Second-class tickets by all lines will be $17. The New England rates will be based on a rate of $22 for limited tickets between Boston and Chicago by routes crossing the Hudson north of New York city, which will include the Erie's new line by way of Newburg and the New York & New England Railroad. By routes passing through New York city the rate will be the New York-Chicago rate plus the local rate east of New York and the cost of transfer through or around New York (75 cents), which is what the New York Central demanded in the first place. But as the rate by the northern lines is increased from $21 to $22, between Boston and Chicago, the difference in cost of tickets by the two routes is reduced to $3.75. If the Pennsylvania should make connection with the New York & New England at Newburg it would be able to make as low Boston rates as the northern lines.

The persons invited to sit on the "advisory commission" which is to report on the differences of rates to the seaboard cities are not named as yet. One of them is reported to have accepted, and the others to require further information.

A great deal of work will have to be done before the terms on which traffic shall be divided are determined; but it will not be necessary to wait for this before advancing rates, should circumstances make an advance possible and advisable. An advance in passenger rates might be made, it would appear, without further delay; but there has been a disposition to wait until the question of rates for Boston tickets *via* New York and Albany has been settled.

EUROPEAN ISSUES OF CAPITAL in 1881 are tabulated in the Belgian *Moniteur des Intérêts Matériels*, showing a total of $1,435,775,244, which is nearly 30 per cent. more than in 1880, but 25 per cent. less than in 1879 (when a very large part of the whole was for the renewal or conversion of old government debts), 65 per cent. more than in 1878, and 5 per cent. less than in 1877. Of the total issues in 1881, $578,878,340 was for railroad or other industrial enterprises. Nearly half of this vast sum was for Great Britain and its colonies; France comes next with $120,438,000 for railroads, and "America" follows with $77,400,000. No other country is credited with more than $22,000,000 of capital raised for railroads within the year.

As the United States during the year built at least 9,000 miles of railroad, and there was also a vast amount of work done in improving and adding to the equipment of the 93,000 miles of railroad existing at the beginning of the year, we are probably within bounds when we say that at least 225,000,000 of dollars of capital was required for railroad construction here, a very small portion of which, if any, was raised in Europe. The table includes, of course, only issues offered to public subscriptions, as there is no way of getting track of any others. Against our immense investment in new railroads compare Russia's, amounting to less than $22,000,000; yet Russia doubtless has more room for railroads—more fertile and tolerably populated country inadequately supplied with transportation—than the United States.

In the European issues of capital, the government and municipal loans slightly exceed the railroad issues. A third place is taken by financial institutions (banks, etc., like the Union générale) for which capital is almost never publicly raised in this country. These absorbed $258,140,000 in 1881, nearly half being in France, and more being issued for these than for railroads in Germany, Austria, Hungary, Spain, France, Holland, Sweden and Norway.

The total English issues ($361,000,000) are considerably less than the French, but those for the banks and railroads are said to be the largest since 1865. Its total in 1880 was but $90,000,000, in 1879, $167,000,000.

MR. JOHN M. TOUCEY, Superintendent of the New York Central & Hudson River Railroad, was included among those whom the coroner's jury found directly responsible for the late terrible accident at Spuyten Duyvil. The verdict published in our last week's issue (received just as we were going to press) was prefaced by the statement that "it seemed to be justified by the evidence." We desire to say emphatically that so far as Mr. Toucey is concerned we do *not* think the verdict was justified by the evidence. There was nothing whatever to show that Mr. Toucey was negligent. The verdict seems to blame him for not introducing new safety appliances upon the railroad which he superintends;

RAILROAD EARNINGS IN DECEMBER.

Name of Road.	Mileage.					Earnings.					Earnings Per Mile.				
	1881.	1880.	Inc.	Dec	P.c.	1881.	1880.	Increase.	Decrease.	P. c.	1881.	1880.	Inc.	Dec.	P. c.
						$	$	$	$		$	$	$	$	
Ala. Gt. Southern	290	290				86,912	61,275	25,637		42.0	299	211	88		42.0
Baltimore & Ohio	1,512	1,467	45		3.1	1,617,688	1,440,279	177,409		12.3	1,070	989	81		8.2
Buffalo, Pitts. & West	170	170				55,535	44,475	11,060		24.8	327	262	65		24.8
Bur., Ced. Rap. & No.	590	564	26		4.6	232,812	193,419	39,393		20.4	395	343	52		15.2
Cairo & St. Louis	146	146				41,396	37,407	3,989		10.7	283	256	27		10.7
Central Iowa	207	191	16		8.4	99,278	81,402	17,876		22.1	480	426	54		12.7
Central Pacific	2,775	2,590	185		7.1	2,110,000	1,905,221	204,779		10.7	760	733	27		3.8
Chicago & Alton	847	840	7		0.8	635,307	574,693	60,612		10.6	750	684	66		9.7
Chi. & Eastern Ill	232	220	12		5.5	151,671	128,981	22,690		17.6	654	586	68		11.7
Chi. & Gd. Trk	335	335				139,723	115,272	24,451		21.3	417	344	73		21.3
Chi., Mil. & St. Paul	4,100	3,775	325		8.5	1,855,000	1,397,308	457,692		32.7	452	370	82		21.6
Chi. & Northwestern	3,010	2,760	250		9.5	1,835,200	1,477,902	357,298		24.2	609	535	74		13.7
Chi., St. P., M. & O.	980	940	40		4.3	291,950	312,173	79,777		25.5	400	332	68		20.5
Cin., Ind., St. L. & Chi.	300	300				192,623	198,254		5,631	2.8	642	661		19	2.8
Cin. Southern	335	335				230,471	152,475	77,996		51.3	688	455	233		51.3
Cleve., Mt. V. & Del.	144	144				37,974	35,547	2,427		6.7	264	247	17		6.7
Col., H. V. & Toledo	320	320				261,223	202,969	58,254		28.7	816	634	182		28.7
Denver & R. G	1,062	551	511		92.9	643,417	349,196	294,221		84.1	606	634		28	4.4
Det., Lan. & No	226	2.6				120,241	96,192	24,049		25.0	532	425	107		25.0
Des Moines & Ft. D'ge	84	84				26,489	24,722	1,767		7.0	315	294	21		7.0
East Tenn., Va. & Ga	900	900				302,957	302,525	432		0.1	337	336	1		
Flint & Pere Mar	318	318				168,821	151,112	17,709		11.7	531	475	56		11.7
Gulf, Col. & S. F	3.0	188	132		70.2	140,068	82,063	58,005		70.7	438	437	1		
Hannibal & St. Jo	292	292				180,376	207,281		26,905	13.0	618	709		91	13.0
Houston, E. & W. Tex	103	84	19		22.6	21,841	10,527	11,314		107.7	212	125	87		69.6
Ill. Cen., Ill. lines	918	918				539,190	522,565	16,625		3.2	587	567	20		3.2
Iowa lines	402	402				169,964	156,616	19,348		12.8	423	375	48		12.8
Ind., Bloom. & West	402	402				156,697	162,764		6,067	3.7	390	405		15	3.7
Ind., Dec. & Springf	153	153				37,998	37,893	105		0.3	248	249	1		0.3
Kan. C., Ft. S. & G	320	305	15		4.9	152,796	127,340	25,456		20.0	477	417	60		14.8
Lake Erie & Western	386	386				107,904	102,503	5,401		5.2	279	265	14		5.2
Long Island	335	320	15		4.7	134,780	104,374	30,406		29.2	402	326	76		23.3
Louisville & Nash	2,060	1,840	220		11.9	1,122,285	949,185	173,100		18.2	546	516	30		5.9
Mem. & Charleston	292	292				137,400	157,593		20,193	12.7	471	540		69	12.7
Mem., Pad. & No	115	115				17,616	17,110	506		2.9	153	149	4		2.9
Mil., Lake Sh. & West	280	250	30		12.0	61,845	40,146	21,699		54.2	221	161	60		37.4
Mo., Kan & Texas	1,778	1,408	370		26.4	790,950	619,385	171,565		27.7	445	440	5		11.3
Mo. Pacific	1,150	990	160		16.2	688,541	499,676	228,865		49.8	599	464	135		29.1
Mobile & Ohio	506	506				262,025	287,372		25,347	8.8	518	538		50	8.8
Nash., Chatta. & St. L.	467	467				173,127	175,996		2,869	1.6	371	377		6	1.6
N. Y. & N. England	396	316	80		25.3	237,729	198,107	39,622		20.0	600	627		27	4.3
Norfolk & Western	428	428				196,789	181,746	15,043		8.2	460	425	35		8.2
Northern Central	326	326				476,623	494,310		17,687	3.6	1,482	1,516		54	3.6
Northern Pacific	972	722	250		34.7	434,331	220,093	213,238		96.9	447	306	141		46.7
Ohio Central	231	231				90,020	25,768	64,252		247.1	389	112	277		247.1
Pad. & E'town	185	185				50,525	37,063	13,462		36.4	273	200	73		36.4
Pennsylvania	1,925	1,890	35		1.9	3,731,810	3,547,827	183,983		5.2	1,938	1,877	61		3.5
Peo., Dec. & Evansv.	254	190	64		33.7	58,705	37,159	21,546		58.2	231	195	36		18.5
St. L., A. & T. H., M. Li'e	195	195				86,009	101,950		15,941	15.3	441	523		82	15.3
Belleville Line	121	121				67,843	82,552		14,709	18.0	561	682		121	18.0
St. L., Iron Mt. & So.	720	685	35		5.1	709,408	656,951	52,547		8.0	985	959	26		2.7
St. Louis & San Fran.	645	592	53		9.0	287,914	222,855	65,059		29.2	446	376	70		18.6
St. P., Minn. & Man	910	740	170		23.0	528,263	297,641	230,622		77.4	580	402	178		44.4
Scioto Valley	128	100	28		28.0	43,741	24,802	18,939		75.8	341	248	93		37.1
Texas & Pacific	1,050	700	350		50.0	381,218	301,858	79,360		26.4	363	431		68	15.8
Tol., Del. & Bur	395	285	110		38.6	74,059	44,874	29,185		64.7	187	157	30		18.7
Union Pacific	3,660	3,120	540		17.3	2,267,004	1,869,835	397,169		21.2	619	599	20		3.4
Wab., St. L. & Pacific.	2,350	2,480	870		35.1	1,328,278	962,608	365,670		38.0	396	388	8		2.1
Wisconsin Central	520	454	66		14.6	164,723	111,025	53,698		48.3	317	245	72		29.4
Total. 59 roads	45,373	40,344	5,029			27,347,173	22,917,114	4,565,408	135,349		603	568	35		
Total inc. or dec			5,029		12 5			4,430,059		19.3			35		6 2

RAILROAD EARNINGS, YEAR ENDING DECEMBER 31.

Name of Road.	Mileage.					Earnings.					Earnings per Mile.				
	1881.	1880.	Inc.	Dec	P. c	1881.	1880.	Increase.	Dec.	P. c.	1881.	1880.	Inc.	Dec.	P. c.
						$	$	$	$		$	$	$	$	
Ala. Gt. Southern	290	290				787,518	644,331	143,187		22.2	2,716	2,222	494		22 2
Bur., Cedar Rap. & No.	567	498	69		13.9	2,259,037	2,053,484	205,553		20.2	3,984	4,143		159	3.8
Cairo & St. Louis	146	146				423,793	412,621	11,172		2.7	2,902	2,826	76		2.7
Canada Southern	400	400				3,372,305	3,705,679		333,374	9.0	8,431	9,264		833	9.0
Central Pacific	2,725	2,414	311		12.9	23,947,951	20,508,112	3,439,839		16.8	8,788	8,495	293		3.4
Chi. & Alton	844	840	4		0.5	7,553,988	7,718,198		164,210	2.1	8,950	9,188		238	2.6
Chi., Mil. & St. Paul	3,860	2,873	987		34.4	17,026,000	13,086,112	3,939,888		30.1	4,411	4,555		144	3.2
Chi. & Northwestern	2,840	2,457	383		15.6	21,828,931	19,416,009	2,412,922		12.4	7,686	7,902		216	2.7
Chi., St. P., Minn. & O.	964	777	187		24.1	3,981,296	3,122,097	859,199		27.7	4,130	4,018	112		2.8
Cin., Ind., St. L. & Chi.	300	300				2,296,916	2,412,185		115,269	4.7	7,656	8,041		385	4.7
Cleve., Mt. Ver. & Del.	144	155		11	7.1	424,276	429,598		5,322	1.2	2,946	2,772	174		6.3
Denver & Rio Grande	786	474	312		66.4	6,206,813	3,478,007	2,728,806		78.5	7,897	7,338	559		7.6
Des Moines & Ft. Dodge	84	84				392,733	312,751	79,982		25.6	4,675	2,723	952		25.6
East Tenn., Va. & Ga.	613	613				2,649,811	2,452,153	197,658		8.1	4,323	4,000	323		8.1
Flint & Pere Marq.	318	307	11		3.6	1,858,255	1,596,948	261,307		16.3	5,844	5,209	635		12.2
Great Western	526	526				5,232,553	5,175,546	57,007		1.1	9,948	9,839	109		1.1
Hannibal & St. Jo.	292	292				2,230,968	2,489,037		258,069	10.3	7,657	8,525		868	10.3
Houston, E. & W. Tex.	94	73	21		28.8	165,728	99,843	65,885		66.0	1,763	1,368	395		28.9
Ill. Cent., Ill. lines	918	903	15		1.7	6,686,280	6,528,745	157,535		2 4	7,284	7,230	54		0.8
Iowa lines	402	402				1,856,662	1,775,488	81,174		4.6	4,618	4,416	202		4.6
Ind., Bloom. & West	308	308				1,636,246	1,642,500		6,254	0.4	5,312	5,333		21	0.4
Ind., Dec. & Springf.	153	153				503,008	429,192	73,816		17.2	3,288	2,805	483		17.2
Kan. City, Ft. Scott & G.	313	221	92		41.8	1,547,259	1,206,724	340,535		28.2	4,943	5,460		517	9.5
Lake Erie & West	386	361	25		6.9	1,373,012	1,184,161	188,851		16.0	3,557	3,280	277		8.5
Lake Shore & Mich. So.	1,178	1,178				17,970,000	18,749,461		779,461	4.2	15,255	15916		661	4.2
Louisville & Nashv.	1,881	1,571	310		29.7	11,326,859	9,491,346	1,835,513		19.2	6,022	6,042		20	0.3
Memphis & Charleston	292	292				1,235,091	1,168,545	66,546		5.7	4,230	4,002	228		5.7
Memphis, Pad. & No.	115	115				238,712	212,913	25,799		12.1	2,076	1,851	225		12.1
Michigan Central	913	804	109		13.6	8,936,000	9,085,749		149,749	1.6	9,788	11301		1513	13.4
Mil., Lake Sh. & West	255	219	36		16.4	630,822	427,751	203,071		47.3	2,474	1,953	521		26.7
Mo., Kan. & Tex	1,630	1,335	295		22.7	8,019,743	6,127,217	1,892,526		31.0	4,920	4,590	330		7.2
Mo. Pacific	1,067	911	156		17.3	6,783,327	5,420,579	1,362,748		25.0	6,357	5,950	407		6.5
Mobile & Ohio	506	506				2,406,437	2,273,622	132,815		5.8	4,756	4,493	263		5.8
Nash., Chatta. & St. L.	467	457	10		2.2	2,075,256	2,049,423	25,833		1.3	4,444	4,485		41	0.9
Norfolk & Western	428	428				2,257,192	2,064,195	192,997		9.4	5,274	5,823	451		9.4
Northern Central	326	326				5,443,700	5,050,387	393,313		7.8	16,698	15492	1206		7.8
Northern Pacific	822	695	127		18.2	4,044,576	2,629,710	1,414,866		53.8	4,920	3,784	1136		30.0
Paducah & E'town	185	185				544,730	403,612	141,118		34.9	2,890	2,182	708		34.9
Pennsylvania	1,914	1,877	37		2.0	44,124,182	41,260,072	2,864,110		6.9	23,053	21982	1071		4.9
Peoria, Dec. & Evans.	238	180	58		32.2	688,073	448,928	239,145		53.2	2,891	2,494	397		16.0
Pittsburgh & Lake Erie	70	70				1,041,063	841,257	199,806		23.7	14,798	11958	2840		23.7
St. L., Alt. & T. H., Main Line	195	195				1,371,034	1,417,662		46,628	3.3	7,031	7,270		239	3.3
Belleville Line	121	96	25		26.0	741,767	729,074	12,693		1.8	6,130	7,595		1465	19.3
St. L., Iron Mt. & So.	690	685	5		0.7	7,319,744	6,265,597	1,054,147		16.8	10,608	9,147	1461		15.9
St. L. & San Francisco.	640	561	79		14.1	3,160,245	2,693,572	466,673		17.3	4,938	4,801	137		2.8
St. P., Minn. & Manitoba	874	663	211		31.9	4,878,960	3,160,231	1,718,729		54.4	5,582	4,766	816		17.1
Scioto Valley	117	100	17		17.0	439,741	317.065	122,676		38.7	3,758	3,171	587		18.5
Texas & Pacific	794	508	286		57.0	3,921,569	2,715,548	1,206,021		44.5	4,939	5,346		407	7.6
Union Pacific	3,518	3,047	471		15.4	27,451,831	23,448,445	4,003,386		17.0	7,803	7,695	108		1.4
Wabash, St. L. & P	2,720	2,075	645		30.7	14,461,570	12,336,152	2,125,418		17.3	5,317	5,945		628	10.6
Wisconsin Central	454	454				1,343,125	1,146,353	196,772		17.2	2,958	2,525	433		17.2
Total. 51 roads	40,683	35,400	5,294	11		299,096,688	263,813,987	37,141,037	1,858,336		7,352	7,452		100	
Total inc. or dec			5,283		14.9			35,282,701		13.4				100	1.3

but every one knows that a superintendent never has authority to order the expenditure of capital for improvements. That is the province of the board of directors—of the representatives of the stockholders who hold the purse-strings, who may themselves delegate such authority to an executive committee. To reach the persons responsible for not introducing the block system or any other safety appliance which might have prevented the accident, it is necessary to go higher up than Mr. Toucey, who is a conscientious and faithful officer, and at least should not be blamed for not doing what he had no power to do.

THE NEW YORK ELEVATED RAILROADS now carry nearly as many passengers as the London underground roads. For the year ending with September last they carried 75,585,778, an average of 203,542 daily. The largest number carried in any one day since the roads were built (Sept. 19, 1881) was 302,025. The average fare received last year was 6.98 cents. On the London roads it is about 4½ cents; but they do not charge uniform fares, but vary for distances and the three classes of passengers. They cover, too, a very large number of passengers who pass but a very short distance over the underground roads, which serve as a terminus or part of the city line of a large number of the leading railroads of the kingdom.

In the last three months of 1881 the New York elevated roads carried 21,633,019 passengers, which was 24 per cent. more than in the corresponding quarter of 1880. In that time there had been no change in the length of road worked.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Huntingdon & Broad Top Mountain, annual meeting, at the office in Philadelphia, Feb 7, at noon.

Marietta & Cincinnati, annual meeting, at the office in Cincinnati, Feb. 15.

Dividends.

Dividends have been declared as follows:

Pullman's Palace Car Co., 2 per cent., quarterly, payable Feb. 15.

Cedar Rapids & Missouri River (leased to Chicago & Northwestern), 3½ per cent., semi-annual, on preferred stock, and 1½ per cent., quarterly, on common stock, payable Feb. 1.

Connecticut & Passumpsic Rivers, 3 per cent., semi-annual, on the preferred stock, payable Feb. 1. The same dividend is also paid on stock of the leased *Massawippi* road.

Rutland, $1 per share on the preferred stock, payable Feb. 15. Transfer books close Feb. 5.

Chicago & Alton, 4 per cent., semi-annual, payable March 1. Transfer books close Feb. 11.

Illinois Central, 3½ per cent., semi-annual, payable March 1. Transfer books close Feb. 11.

Foreclosure Sales.

The *Washington & Ohio* road was sold in Alexandria, Va., Jan. 31, under a decree of the Virginia Circuit Court, and bought by Cazenove Glee for $590,000. The purchaser is said to represent parties interested in the projected Baltimore, Cincinnati & Western road. The road is in operation from Alexandria to Round Hill, 52 miles. Its projected line extends through West Virginia to the Ohio. The road has been in the hands of a receiver for several years, the foreclosure suit having been carried up to the Court of Appeals.

ELECTIONS AND APPOINTMENTS.

Atlantic & Pacific.—The following order has been issued by Acting Chief Engineer Lewis Kingman:

"R. N. Billings is hereby appointed Resident Engineer, with headquarters at Cranes, N. M., to take charge of track, bridges and buildings from Albuquerque to the front; to lay out, measure and estimate all contract work, and superintend the same, that may be necessary for the improvement and protection of the road-bed.

"The Master Carpenter, road masters, construction trains and water service will be under his direction and subject to his orders. Their check rolls and accounts must be sent or handed to him; and no accounts from his jurisdiction will pass this office without his approval. He will be expected to look after the work and see that men intrusted to responsible positions do their work faithfully and hold those under them to their duty.

"W. A. Drake is hereby appointed Resident Engineer, with headquarters at Williams, Ariz., to take charge of construction from section 306, at Padre Cañon, to section 554, at the Colorado River. The several Division Engineers (except T. F. Richardson) will be subject to his orders. He will be required to certify to all vouchers, estimates, check rolls and accounts of the Division Engineers in his charge; to examine their work and notes and to see that they are correct before being sent to this office; to see that Division Engineers give grades and centres and attend to their other duties faithfully.

"The following Division Engineers, who have heretofore been employed by Mr. Holbrook, are continued in their several places: T. F. Richardson to have charge of the masonry and grading from and including Cañon Diablo to and including Padre Cañon. All matters pertaining to that work will be under his charge, and he will report direct to this office.

"C. F. Lawton, in charge of division from section 305 to 325 inclusive; John McGuire, section 336 to 351; Geo. S. Van Law, section 352 to 374; Horace Ropes, section 375 to 384; J. M. Clark, section 385 to 410; F. W. Meeds, section 411 to 436; C. S. Henning, section 437 to 460; H. C. Todd, section 461 to 476; Albert Drake, section 476 to 492; W. G. Middleton, section 493 to 510.

"All division engineers (except T. F. Richardson) are required to report to W. A. Drake, Resident Engineer. All orders from this office will be transmitted through him, except in cases of emergency, when they will be sent direct.

"All division engineers are requested to send a weekly report to this office giving information in regard to the progress of the work, number of men employed and points of interest. Write short, comprehensive letters, pointing out any defects, so that the Chief Engineer can act intelligently in regard to the work.

"H. B. Hedges, Wm. S. Steele and R. R. Swisher are now appointed Division Engineer's assistants, to remain in their several places until further notice.

"Alfred Gregory, who has heretofore been in charge of the bridging at the front, will remain in charge and complete the repairs of bridges heretofore contemplated, and report at this office.

"Wm. F. Hill, who has been acting as assistant to R. N. Billings, will report to him until further notice.

"A. W. Phelps, who has been in charge of the material yard at Cranes, N. M., will continue in that place; make weekly reports as heretofore, and send one copy of the same to F. W. Smith, General Superintendent, and one copy of the aforesaid report to this office.

"Ralph Halloran, who has heretofore occupied the position of Commissary, will continue to act in that capacity. All accounts, vouchers and contracts with freighters, a weekly statement of about what is on hand, together with an occasional letter in regard to the business, are to be sent to this office.

"J. C. Miner will continue to inspect ties and timber, and report to this office.

"Walters C. Sanders, who has heretofore acted as Chief Clerk, will continue in that capacity.

"C. W. Sanders, who has heretofore acted as Office Engineer, will continue as such.

"Wm. McAdams, A. C. Aldrich, F. W. H. Cutter and C. J. Quetil, who have been draughtsmen in the office, will continue in their several places.

"Resident Engineer R. N. Billings is authorized to issue passes at his discretion to the employés of his department."

Allegheny Valley.—Mr. J. A. Kingsbury has been appointed General Passenger Agent in place of J. M. Hall, resigned. Mr. Kingsbury was formerly General Freight and Ticket Agent of the Marietta, Pittsburgh & Cleveland road.

Ashburnham.—This company elected the following directors at the annual meeting in Ashburnham, Mass., last week: J. F. Litch, C. F. Rockwood, G. G. Rockwood, J. H. Wilkins, G. C. Winchester. The board elected C. F. Rockwood President; J. H. Wilkins, Treasurer and Superintendent; G. F. Stevens, General Ticket Agent.

Black Hills.—The officers of this company are: Samuel McMaster, President; T. J. Grier, Secretary and Treasurer; S. R. Johnson, Superintendent. Office at Deadwood, Dakota.

Boston, Barre & Gardner—At the annual meeting, Feb. 1, the following directors were chosen: Charles Heywood, Levi Heywood, Gardner, Mass.: Nelson D. White, Winchendon, Mass.; A. G. Bullock, Calvin Foster, Samuel R. Heywood, Wm. H. Morse, Wm. W. Rice, Stephen Salisbury, Jr., E. B. Stoddard, H. M. Witter, Worcester, Mass.

Boston, Hoosac Tunnel & Western.—General Superintendent J. L. Wellington takes immediate charge of the Eastern Division in place of E. B. Burnham, resigned.

Mr. John F. Corbin is appointed Train Dispatcher, and Wm. Archer Assistant Train Dispatcher, in place of G. S. Gould and A. N. Smith, resigned.

Buffalo & Rock City Pipe Line.—At the annual meeting in Buffalo last week the following directors were elected: Franklin H. Kalbfleisch, Alfred P. Wright, Albert M. Kalbfleisch, Daniel N. Lockwood, R. H. Lee, Theodore V. Fowler, John H. Flagg. The board elected the following officers: President, Franklin H. Kalbfleisch: Vice-President, A. P. Wright; Treasurer, Albert M. Kalbfleisch; Secretary, Theodore V. Fowler.

California Southern.—The directors of this company as consolidated are: James S. Gordon, Moses A. Luce, Joseph O. Osgood, Thomas L. Rogers, San Diego, Cal.; Thomas Nickerson, Boston. The officers are: Thomas Nickerson, President; Thomas L. Rogers, Vice-President; G. Norman Weaver, Secretary; S. W. Reynolds, Treasurer and Assistant Secretary; H. E. Cooper, Attorney, J. H. Goodspeed, Auditor; Joseph O. Osgood, Chief Engineer.

Central, of New Jersey.—Mr. James F. Randolph is appointed Superintendent of the Long Branch Division. He has been for two years past Superintendent of the High Bridge Branch.

Chicago & Alton.—Mr. H. H. Lyons has been appointed General Car Conductor, with office at Bloomington, Ill. He has been on the Chicago & Northwestern for some years.

Mr. W. A. Beatty has been appointed Division Freight Agent for the Missouri Division in place of G. McFadden, resigned.

Chicago, Milwaukee & St. Paul.—Dating from Jan. 23, Mr. Louis Blankenhorn is appointed Division Freight Agent of the Chicago Division, with immediate charge of through rates between Milwaukee and common points in the East, South and Southwest, and with the percentage divisions of such rates. Mr. Blankenhorn is a young man, a native of Poughkeepsie, N. Y., whose early experience was on the little Rhinebeck & Connecticut road, on which he occupied the offices of General Freight Agent, Auditor, and perhaps some others, resiguing a few years ago to enter the general office of the Milwaukee & St. Paul. He is a very industrious and faithful officer, who has taken special pains to keep himself well informed.

Chicago & Northwestern.—Mr. George M. West has been appointed Assistant Superintendent of the Peninsula Division, a new office. Mr. West has been Train Dispatcher of the division for several years.

Chicago, St. Louis & New Orleans.—The following appointments date from Feb. 1: Mr. John Watkins, Paymaster; H. H. Febiger, Purchasing Agent; W. H. Pries, Assistant Auditor.

Chicago, St. Paul, Minneapolis & Omaha.—Mr. H. S. Wakeman is appointed Train Dispatcher of the Sioux City Division, with office at Sioux City, Ia., in place of C. J. Wilson, transferred to the Northern and Eastern Division.

Chicago & Western Indiana.—The officers of this company as consolidated are: President, John B. Brown; directors, Andrew Crawford, Roswell Miller, Charles B. Sawyer, Joseph T. Torrence; Secretary, Henry W. Chester.

Connecticut Railroad Commission.—The Governor of Connecticut has appointed Mr. Wm. Hayward, of Colchester, a member of the Railroad Commission for another term.

Fitchburg.—At the annual meeting in Boston, Jan. 31, the following directors were chosen: Wm. B. Stearns, Seth Bemis, Robert Codman, Rodney Wallace, C. V. Cotting, Franklin N. Poor, Charles T. Crocker. Messrs. Poor and Crocker are new directors, the number being increased from five to seven. The board re-elected Wm. B. Stearns President; T. Whittemore, Clerk; Mason D. Benson, Treasurer.

Mr. J. Whitmore has been appointed Traffic Manager. The office has been vacant several months. He was recently General Manager of the Commercial Express fast freight line.

Minnesota & Dakota Northern.—This company has elected S. G. Comstock President; H. A. Bruns, Vice-President; A. A. White, Secretary; E. E. Moore, Treasurer.

New York, Chicago & St. Louis.—At the annual meeting in Cleveland, Jan. 31, the following directors were chosen: C. R. Cummings, Chicago; C. S. Brice, Lima, O.; Charles Foster, Fostoria, O.; Samuel Thomas, Columbus, O.; Daniel P. Eels, Cleveland, O.; Walston H. Brown, Wm. Flannery, H. R. Lyman, John T. Martin, George I. Seney, Alexander White, New York.

Mr. James W. Bone has been appointed Car Accountant, with office in Cleveland, O. He was recently with the Pennsylvania Company.

New York, Lackawanna & Western.—Mr. Peter Rafferty, of Buffalo, N. Y., has been appointed Superintendent of Construction of the Western Division.

New York & New England.—Mr. J. G. D. Knight is appointed General Agent in Boston, a new position. He will have the immediate control of the local passenger agency, Washington street office, and local freight agency, including the warehouse and elevator, at Boston, South Boston and First street, and of all persons employed in connection therewith, except yardmen. All freight, passenger and baggage agents at Boston will report to and receive their instructions from him on all matters excepting rates. No change is made in either passenger or local freight agency.

Northern Pacific.—General Manager Haupt has issued a circular stating that John H. Ames has been transferred from New York to St. Paul as General Purchasing Agent of the road, and will take charge of the purchasing of supplies for both the operating and construction departments.

Mr. E. K. Punnett has been appointed Auditor of Construction and other accounts for Montana, with office in Helena.

Mr. J. F. Curtis has been appointed Master Mechanic of the Pend d'Oreille Division. He was formerly Master Mechanic of the Pacific Division and lately of the Oregon Railway & Navigation Company.

Painesville & Youngstown.—The Court of Common Pleas of Lake County, O., has appointed Ralph R. Paige, of Painesville, O., Receiver of this road.

Paw Paw.—This company has elected F. B. Adams President; H. Ford, Secretary; E. Martin, Treasurer; J. B. Ihling, Superintendent.

Pennsylvania.—Mr. John Whittaker has been appointed General Agent for New York and New England in place of Mr. Milton H. Smith, who has gone to the Louisville & Nashville road.

Providence, Warren & Bristol.—At the annual meeting in Providence, R. I., Jan. 30, the following directors were chosen: Wm. Goddard, T. P. I. Goddard, Wm. R. Robeson, Royal C. Taft, Francis M. Weld, Henry A. Whitney. The board re-elected Henry A. Whitney President.

Richmond & Louisville.—This company has been organized with the following directors: Wm. E. Peery, Tazewell, Va.; G. C. Wharton, New River, Va.; T. A. Lambert, Washington; John P. Poe, Baltimore: Charles Payson, New York; Frank E. Gregory, J. L. Meigs, Washington. The board elected J. L. Meigs, President; W. H. Curtis, Secretary.

St. Louis & San Francisco.—At a meeting of the board in New York, Jan. 27, Messrs. Jay Gould, C. P. Huntington, Russell Sage and Leland Stanford were chosen directors in place of Ozias Bailey, Walter L. Frost, Francis B. Hayes and Alden Speare, resigned. It is said that no other changes will be made at present.

Shenandoah Valley.—Mr. W. C. De Armond has been appointed Purchasing Agent of this company, appointment taking effect from Jan. 1. He will purchase all the supplies required for the company's use. Requisitions for the same must be made upon him at his office, Nos. 37 and 39 South Third street, Philadelphia.

Springfield & New London.—At the annual meeting in Springfield, Mass., Jan. 25, the following directors were chosen: J. H. Appleton, Wm. Birnie, C. O. Chapin, E. P. Chapin, C. L. Covell, Henry Fuller, James Kirkham, E. W. Ladd, E. D. Metcalf, Virgil Perkins, Marcellus Pinney, Horace Smith, J. M. Stebbins. The road is leased to the New York & New England Company.

Sussex Midland.—At a meeting held at Bridgeville, Del., Jan. 19, the following were chosen: President, L. R. Jacobs; directors, D. F. Ball, M. L. Blanchard, Isaac P. Cartrell, G. S. Layton, D. S. Myers, Simon Pennewill, Joseph R. Richards.

Toledo & South Haven.—This company has elected F. B. Adams President; H. Ford, Secretary; E. Martin, Treasurer; J. B. Ihling, Superintendent.

Utica, Clinton & Binghamton.—At the annual meeting in Utica, N. Y., Jan. 25, the following directors were chosen: George B. Phelps, David W. Ingals, Frank D. Beebe, Allen Curtis, John W. Lippitt, Allen W. Reynolds, James I. Scollard, William S. Bartlett, R. S. Williams, John Thorn, W. M. Storrs, Isaac Maynard, G. W. Adams. Inspectors of election, A. N. Sheldon, J. J. Hanchett, W. T. Manchester. The board elected Isaac Maynard President; George B. Phelps, Vice-President; Robert S. Williams, Secretary and Treasurer; Frank J. Callanan, Assistant Treasurer; Roger Rock, Superintendent of street railroad. The company's steam railroad is operated by the Delaware, Lackawanna & Western Company.

Woodstown & Swedesboro.—This company has been organized with the following officers: President, Wm. J. Sewell; Secretary and Treasurer, Wm. Taylor; Chief Engineer, Joseph Crawford; Assistant Engineer, J. W. Allen. Office at Camden, N. J.

PERSONAL.

—Mr. H. M. McCartney, Engineer in charge of the Pend d'Oreille Division of the Northern Pacific, has resigned on account of ill health, and will go to Southern California for a time.

—It is reported that E. P. Vining, General Freight Agent of the Union Pacific, is to be made General Traffic Manager, with charge of the passenger as well as the freight business.

—Mr. Charles B. Evans, formerly with the Buffalo, Pittsburgh and Western Company, has left that road to become General Sales Agent of the Buffalo Coal Company, with office in Buffalo.

—E. B. Burnham, Superintendent, G. S. Gould, Train Dispatcher, and A. N. Smith, Assistant Train Dispatcher, of the Boston, Hoosac Tunnel & Western road, resigned their respective positions Feb. 1.

—Mr. Wm. E. Rutter died suddenly of heart disease at Elmira, N. Y., Dec. 28, aged 70 years. Ht was Car Tracer for the Pennsylvania Railroad, and was father of Mr. James H. Rutter, Third Vice-President of the New York Central road.

—Miss Belle Braden, who has recently been re-elected Treasurer of the Waynesburg & Washington Railroad, in Pennsylvania, for a second term, is probably the only lady in the United States who is a railroad officer. She is also Paymaster, and makes regular trips over the road in the pay car.

—Mr. John W. Garrett, President of the Baltimore & Ohio Company, has presented to the state of Maryland a portrait of George Calvert, Lord Baltimore, the first proprietor and Governor of the colony. The portrait is a copy from a contemporary painting by Mytens, who was court painter to James I. of England.

—Mr. Alexander Lyman Holley, one of the leading metallurgical and mecanical engineers of this country, died at his residence in Brooklyn, N. Y., Jan. 29. The immediate cause of his death was peritonitis, due to a complication of diseases. He was first taken ill in Belgium about a year ago. He went to London, and as his health did not improve, he recently returned home on the advice of his physicians. At the time of his death Mr. Holley was receiving a large salary as Constructing Engineer of the Associated Bessemer Steel Manufacturers in the United States, and having already acquired considerable property he left his family in comfortable circumstances.

—Mr. Moses Lane, City Engineer of Milwaukee, Wis., died in that city Jan. 25, aged 59 years. Mr. Lane was born in Vermont, graduated at the University of Vermont and entered upon his profession as Civil Engineer at an early age. He was employed upon the Sullivan County, the Vermont Central and the Albany & Susquehanna roads, and was also a teacher for several years. Since 1857 Mr. Lane had given his attention entirely to hydraulic engineering, attaining to high reputation in that branch. He had been engaged on the water works of Brooklyn, Pittsburgh, Indianapolis, Chicago, Cincinnati, Toledo, Kansas City and Milwaukee. He had lived in Milwaukee since 1871, having had charge as City Engineer from 1871 to 1878, and again for about a year before his death.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Year ending Dec. 31:				
Northern Central..	$5,443,700	$5,050,387	I.	$393,313	7.8
Net earnings....	1,656,254	1,795,118	D.	138,864	7.7
Three months ending Dec. 31:				
Norfolk & Western	$672,314	$626,702	I.	$45,612	7.3
Net earnings....	365,517	339,243	I.	26,274	7.7
Month of December:				
Buf., Pitts. & Wes.	$55,535	$44,475	I.	$11,060	24.8
Net earnings....	27,771	15,155	I.	12,616	84.0
Northern Central..	476,623	494,310	D.	17,687	3.6
Net earnings....	154,989	223,906	D.	68,917	30.8
First week in January:				
	1882.	1881.		
Minn. & St. Louis..	$26,184	$12,413	I.	$13,771	111.0
N. Y. & N. Eng....	49,635	44,281	I.	5,354	12.0
Second week in January:				
Chi. & Alton.....	$139,236	$132,067	I.	$7,169	5.4
N. Y. & N. Eng....	51,029	44,280	I.	6,749	15.0
Third week in January:				
Chi. & East. Ill.....	$38,823	$29,397	I.	$9,426	32.4
Chi. & Gd. Trunk..	31,329	25,032	I.	6,295	25.2
Chi., Mil. & St. P..	314,000	218,717	I.	95,283	43.5
Chi. & N. W	372,300	284,100	I.	88,200	31.0
Great Western....	94,217	91,075	I.	3,142	3.4
St. L., I. M. & So..	120,153	128,926	D.	8,773	6.8
Wab., St. L. & P...	296,965	192,351	I.	104,614	58.6
Week ending Jan. 7:				
Grand Trunk.....	£37,041	£38,880	D.	£1,839	4.7

Grain Movement.

For the week ending Jan. 21 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets, and receipts at the seven Atlantic ports have been, in bushels, for the past six years:

Year.	Northwestern receipts.	Northwestern shipments.	Atlantic receipts.
1877.....	1,721,443	727,113	1,461,707
1878.....	3,513,465	2,488,526	3,517,023
1879.....	3,315,970	1,309,977	2,911,915
1880.....	2,123,288	1,129,930	2,384,258
1881.....	2,760,717	1,532,536	2,509,827
1882.....	4,725,738	2,663,712	1,964,158

The receipts at the Northwestern markets are wholly without example in a winter week, and their shipments are among the largest ever made in winter or by rail at any time. Of these shipments 29,080 bushels, or 1.1 per cent., were by the Mississippi River. The receipts of the Atlantic ports, however, though larger than for several preceding weeks, are still very small—smaller than in the corresponding week of any previous year since 1877.

Of the Northwestern receipts for the week Chicago had 48.2 per cent., St. Louis 17.6, Peoria 15 3, Milwaukee 9.7, Toledo 5.5, Detroit 2, Cleveland 1.4, and Duluth 0.3 per cent.

Of the Atlantic receipts New York had 61.1 per cent., Boston 13, Philadelphia 11.5, Baltimore 8.7, Portland 3.1, New Orleans 1.8 and Montreal 0.8 per cent. Receipts are very light at Baltimore and Philadelphia especially.

Exports of grain and flour from Atlantic ports for the week ending Jan. 25 were 61,330 barrels of flour and 1,171,936 bushels of grain this year, against 147,994 barrels of flour and 2,101,331 bushels of grain last year.

The large Northwestern receipts include comparatively little wheat, 79 per cent. of them were corn and oats. For the week ending Jan. 21, New Orleans exported 20,100 bushels of corn—its first grain exports for three weeks. That week 62.2 per cent. of the exports were from New York, 16.1 per cent. from Boston, 9.8 from Philadelphia, 5.4 from Baltimore, 4.8 from Portland and 1.7 from New Orleans.

Baltimore grain receipts in January were as follows, flour in barrels and grain in bushels:

	1882.	1881.	Decrease.	P.c.
Flour.....	116,864	125,040	8,176	6.5
Wheat.....	351,805	1,217,479	865,674	71.1
Corn.....	238,525	652,450	413,925	63.5
Other grain.....	94,656	113,796	19,140	16.8
Total grain..	684,986	1,983,725	1,298,739	65.5
Total, flour reduced to wheat.....	1,269,306	2,608,925	1,339,619	51.3

Other grain this year included 51,537 bushels oats, 5,810 bushels rye and 37,309 bushels barley. Exports for the month were 28,436 barrels and 3,900 sacks of flour, 301,066 bushels of wheat and 73,699 bushels of corn.

Coal Movement.

Coal tonnages for the week ending Jan. 21 are reported as follows:

	1882.	1881.	Inc. or Dec.	P.c.
Anthracite.....	364,557	538,434	D. 173,877	32.3
Semi-bituminous.....	102,509	50,205	I. 43,304	73.4
Bituminous, Pa.....	66,340	50,677	I. 15,663	30.7
Coke, Pa.....	57,102	47,620	I. 9,482	19.9

The anthracite companies have agreed to a stoppage of mining and shipments for nine days in all in February, three days in each week in the second, third and fourth weeks in the month. The present indications are that this policy of restricting production is likely to continue for some time.

The anthracite tonnage of the Belvidere Division, Pennsylvania Railroad, for the month ending Jan. 28 was as follows:

	1882.	1881.	Inc. or Dec.	P.c.
South Amboy for shipment....	54,443	42,034	I. 12,409	29.5
Local points on N. J. lines.....	45,386	56,098	D. 10,712	19.1
Co.'s use on N. J. lines.....	8,225	9,235	D. 1,010	10.9
Total.....	108,054	107,367	I. 687	0.6

Of the total this year 83,653 tons were from the Lehigh and 24,401 tons from the Wyoming Region.

Chicago receipts of anthracite coal in 1881 were 1,102,748 tons, an increase of 305,499 tons, or 38.2 per cent., over

1880. Of the total receipts 564,263 tons were by lake and 538,485 tons by rail.

Receipts of Western bituminous coal at Chicago for the year were as follows:

	1881.	1880.	Inc. or Dec.	P. c.
Illinois coal	879,305	752,071	I. 127,234	16.9
Indiana coal	369,855	286,683	I. 83,172	29.0
Indiana block coal at rolling mills	150,972	158,768	D. 7,796	4.9
Total	1,400,132	1,197,522	I. 202,610	16.9

The Illinois coal came from the following points in 1881: Wilmington coal field, 739,087 tons; Morris, 14,336; Minonk, 45,581; Streator, 80,301; total, 879,305 tons. Of the Indiana coal, 245,250 tons were from the Fountain County coal field and 275,577 tons from the Indiana block coal district.

Southwestern Association Rates.

East-bound rates from Missouri River points were made as follows, Feb. 1:

	To			
Per 100 lbs.:	Miss. River points. Cents.	Chicago. Cents.	Milwaukee. Cents.	Toledo. Cents.
Class 1	60	75	....	....
Class 2	45	60	....	....
Class 3	30	45	....	....
Class 4	20	27	29½	....
Class 5	19	27	29½	39½
Class 6	20	27	29½	38
Class 7	20	25	27½	30
Class 8	15	20	22½	25
Class 9	20	25	27½	32½
Class 10	20	25	27½	32½
Wheat	17	20	22½	25
Other grain	15	18	20½	23
Fresh meat	35	41½	....	....
Ore and base bullion	17½	23	....	31½
Per car-load:				
Horses and mules	$50.00	$67.50	....	....
Cattle	45.00	60.00	....	....
Hogs and sheep	30.00	45.00	....	....

The fresh meat rates are for carriage in refrigerator cars, in ordinary cars the rate is 5 cents less. Flour is taken out of the eighth class and charged 40 cents a barrel to Mississippi River points.

On shipments made through to the Eastern seaboard cities and to Albany the charge of the Association roads will be slightly different, as follows:

	Class.					
	1	2	3	4	7	8
To Miss. River Points	59	46½	34	17½	20	17
To Chicago	75	60	45	27	24	20
To Toledo	99½	87	62	41½	30	25

Provision Exports.

Exports for the past two years are reported as follows by the Bureau of Statistics:

	1881.	1880.	Decrease.	P.c.
Fresh beef	48,392	50,215	1,823	3.6
Salt beef	21,572	23,006	1,734	7.5
Bacon and ham	303,973	407,951	103,978	25.5
Lard	155,098	206,871	51,773	25.0
Pork	47,214	49,067	1,853	3.8
Butter	10,645	18,740	8,095	43.2
Cheese	70,179	68,183	*1,996	2.9
Tallow	34,558	57,535	22,977	40.0
Total	691,331	881,568	190,237	21.6
Total value	$133,329,242	$143,882,570	$10,553,328	7.3

*Increase.

The decrease in quantities is very large, but in value not so. For the last two months of the year there was a decrease of 21.7 per cent. in the *value* of the provision exports. Then the fresh beef exports were but half as great as in 1880, and there was a decrease of 50,176 tons, or 38 per cent., in the exports of hog products. This decrease, in connection with our greatly decreased exports of breadstuffs, is an important matter, but when breadstuffs are as high as they are now the consumption of meat in Europe is sure to fall off.

The percentage of provision values exported from each port was:

	1881.	1880.
New York	68.7	71.9
Boston	17.9	16.5
Philadelphia	5.8	5.1
Baltimore	3.3	3.8
Port Huron	2.0	1.8
Portland	0.8	0.7
Other ports	1.5	0.8
Total	100.0	100.0

Thus New York and Boston almost monopolize the exports of provisions, having 86.6 per cent. of them in 1881 and 87.8 in 1880, against 9.1 and 8.9 at Philadelphia and Baltimore. This is in striking contrast with the breadstuffs exports, 27.1 per cent. of which went by Philadelphia and Baltimore in the last fiscal year (ending with January) and 30 per cent. the year before.

Switching Charges at Indianapolis.

Shippers and receivers of freight having protested against the charge of $1 per car for all cars delivered on private switches in Indianapolis, the superintendents of the roads interested met last week and, after consultation with several large shippers, agreed to reduce the charge to 50 cents per car.

Indianapolis Live-Stock Traffic.

The Indianapolis Belt Railroad Company, which owns the stock-yards, reports the live-stock traffic at that city as follows for the year ending Dec. 31:

	Receipts.	Shipments.	Local delivery.
Cattle	144,144	120,611	23,533
Horses	9,565	8,900	665
Sheep	225,622	203,246	22,376
Hogs	1,129,894	637,520	492,374
Total, 1881	1,509,225	970,277	538,948
Total, 1880	1,606,044	851,878	754,166
Inc. or Dec	D. 96,819	I. 118,399	D. 215,218
Per cent	6.0	13.9	28.5

There was an increase in cattle, sheep and horses received, but a decrease of 191,482 in the number of hogs. The shipments showed an increase of all kinds, except horses. In local deliveries there was a small increase in cattle and horses, a large increase in sheep and a decrease of 229,488 in the number of hogs.

Passenger Rates.

A meeting was held in New York, Feb. 1, of the Trunk Lines Executive Committee, acting as a standing committee of the Joint Executive Committee. There were present W. K. Vanderbilt, Second Vice-President of the New York Central; Geo. R. Blanchard, Vice-President of the Erie; A. J. Cassatt, First Vice-President of the Pennsylvania, and General Traffic Manager Sargent, of the Grand Trunk. Commissioner Fink represented the Baltimore & Ohio in the absence of an executive officer of that company.

It was resolved that the first and second-class passenger rates, both east and west bound, should be restored to the following basis on Feb. 6: Chicago and New York, limited, $20, and unlimited, $23.25, except by the Pennsylvania and the Baltimore & Ohio roads, which will be $26.50. The second class by all lines will be $17. The New England rates are to be made on the basis of $22, limited, from Chicago to Boston, by way of all routes crossing the Hudson River north of New York city. New England rates through New York city will be made by adding to the New York rates the local rates east of New York by the route of the ticket, together with 75 cents transfer in all cases.

Petroleum.

Stowell's *Petroleum Reporter* gives the production of the Pennsylvania oil regions for December as follows, in barrels of 42 gallons:

	1881.	1880.	Increase.	P. c.
Production	2,480,000	2,238,634	241,365	10.8
Shipments	1,969,581	1,335,613	633,968	47.4
Stock, Dec. 31	26,019,704	18,928,430	7,091,274	37.5
Producing wells	18,300	14,700	3,600	24.5

Of the total stock there was 585,651 barrels at the wells, 100,640 barrels in private tanks and 25,333,413 barrels held by the pipe lines. Increase in stock during the month, 510,419 barrels.

Of the total production 76.3 per cent. was from the Bradford Region and 13.4 per cent. from the Allegheny District, showing 89.7 per cent. from the comparatively new northern districts.

The shipments out of the region were as follows:

	Barrels.	Per ct. of total.
New York	939,965	47.7
Philadelphia	154,110	7.8
Baltimore	44,449	2.3
Boston	540	....
Cleveland	493,839	25.1
Pittsburgh	70,045	3.6
Down the Ohio	12,158	0.6
Local points	87,291	4.4
Refined at Creek refineries	167,184	8.5
Total	1,969,581	100.0

Of the total shipments 610,298 barrels were by rail, the rest by pipe line. Of the oil refined at Creek refineries 52,494 barrels went to New York, 315 to Philadelphia, 2,284 to Baltimore, 59,831 to Boston and 52,260 to local points. For these figures refined oil is reduced to its equivalent in crude.

United States Coal Production.

The Census Office has published the report of Special Agent Pumpelly on the production of bituminous coal in the United States. It appears that the total amount of bituminous coal mined in the United States during the census year 1880 was 42,420,580 tons, of which total 29,842,240 tons were produced in the Appalachian coal field. Allegheny County, Pennsylvania, furnished over one-tenth, and the states of Pennsylvania, Illinois and Ohio nearly three-fourths of the entire product. The average price per ton at the mine in 1880 was $1.22, while in 1870 it was $1.92, at a cost of 88 cents. An average of 431.53 tons was raised per man, and 6.68 per cent. of the year's working time, or about 20 days per man, was lost in strikes. An effort was made to ascertain the amount of coal land which had been worked out, but the result was not altogether satisfactory. Mr. Pumpelly says, however, that sufficient information was gathered to justify the assumption that the exhausted fields form but a very small fraction of the total available coal land. Attention is called to the fact that although the value of the product has fallen, wages have not correspondingly decreased, and the totals prove a gain of nearly a third of a million dollars annually in favor of labor.

The anthracite product was 28,646,995 tons, nearly all furnished by the state of Pennsylvania, making the total coal product of the country for the census year 71,067,576 tons.

England produced 146,818,122 tons in the same year.

RAILROAD LAW.

Pooling Contracts.

In the case of the People of the State of Illinois against the Chicago & Alton Co., the Wiggins Ferry Co., the Madison County Ferry Co. and the St. Louis Bridge Co., the Illinois Circuit Court has given a decision ordering an injunction to issue against the execution of the contracts whereby the freight and passengers of the railroad are carried to and from St. Louis over the St. Louis bridge, and the earnings therefrom are divided among the companies parties to the contract. The chief points of the decision appear to be as follows:

1. The suit was rightfully brought by the Attorney-General in the name of the people of the state, that being a legal and proper method of proceeding.

2. The contract is against pubic policy, as tending to deprive the people of the state who may use the defendant company's railroad of conveniences and facilities for reaching St. Louis which they might otherwise enjoy. The crossings by ferry are for some of them the most convenient and they are deprived by this contract of their use. A contract in restriction of traffic and to prevent competition is not in accordance with public policy.

3. The remedy by injunction is the most direct and convenient in this case and is therefore applied by the Court.

THE SCRAP HEAP.

Locomotive Building.

The Schenectady Locomotive Works at Schenectady, N. Y., recently delivered two passenger engines to the Virginia Midland road and are building several more for the same road.

The Canada Iron & Locomotive Co. purposes building shops at Hochelaga, near Montreal. The town votes a bonus of $500 a year for 10 years, on condition that the shops are kept continuously at work and employ not less than 100 men.

The Boston Machine Co., at South Boston, is reported to be considering the policy of going into the locomotive business. The company built locomotives at one time, but has made none for 15 years.

During the month of January 41 locomotives were shipped from the three shops at Paterson, N. J. All are working to their full capacity.

Locomotive Tests.

Of the trial of the Fontaine engine on freight on the New York Central road last week the Syracuse *Herald* says: "The Fontaine engine did not make a very successful trip between this city and Buffalo with its freight train. It pulled out from here 20 cars loaded with iron, salt, etc. The load, including cars, weighed about 356 tons. This is less by several hundred tons than an ordinary engine is expected to draw. The Fontaine did not prove equal to the task, and had to be pushed over all the hills and otherwise coached on its journey. The force is put upon the upper drivers, these resting upon the lower ones, and friction being depended upon to move the latter. The surface of the drivers is smooth, and when a heavy load is attached, the friction is not sufficient to make the lower drivers turn, and the upper ones slip around. In its present state, competent railway men declare that it is not a success, and must be improved upon in the respect mentioned before it will become practical or popular."

Car Notes.

The Pullman shops at Detroit recently turned out two new sleeping cars to run over the Pennsylvania line between New York and Cincinnati.

The Cayuta Wheel & Foundry Co. at Waverly, N. Y., last year extended its foundry, adding over 80 new pits, and put in a new traveling crane running the whole length of the building. Additions were also made to the machine shop.

The Philadelphia, Wilmington & Baltimore shops in Wilmington, Del., have nearly completed five new passenger cars of the Pennsylvania Railroad pattern, and have begun to build five more.

The Keystone Car Spring Works in Philadelphia were partly destroyed by fire on the night of Jan. 26. A new building 110 by 50 ft. had just been completed adjoining the old works and as an enlargement of them. This will be brought into use at once, so that there will be very little delay in filling orders.

The Indiana Car Co. at Cambridge City, Ind., is finishing up a large order for box cars for the Louisville & Nashville road.

The Terre Haute Car Works at Terre Haute, Ind., are making a number of box cars for the Louisville & Nashville road.

The Pennsylvania Railroad shops at Meadows Station, N. J., are rebuilding and overhauling a number of passenger cars for the West Jersey road.

The Central Railroad, of New Jersey, has ordered a number of new passenger cars from the Wason Manufacturing Co., to be delivered early in the summer.

Bridge Notes.

Meeker & Hedden, of Newark, N. J., have the contract for widening the bridges on the Long Branch Division of the New Jersey Central road for a second track.

Mr. John Lawler has prepared plans and will soon begin work on a pontoon bridge across the Mississippi at Reed's Landing, Wis. There will be a fixed span at each end of the bridge, and instead of a draw-span, a pontoon or floating span 400 ft. long, similar to the one now in use at Prairie du Chien. The cost is estimated at $100,000. It will be used by the Chippewa Valley & Superior road.

Iron and Manufacturing Notes.

Port Oram Furnace at Port Oram, Morris County, N. J., has been leased to Joseph Wharton, of Philadelphia, and will soon be put in blast.

The Chicago & Grand Trunk road is nearly all fenced with cedar posts, set 16 ft. apart, and five barbed wires. This fence was made by the Western Fence Co., of Chicago.

The Ohio Falls Iron Works at New Albany, Ind., were recently closed for repairs, and will start up again as soon as possible.

The two furnaces at Oxmoor, Ala., are operating very successfully. New boilers are being put up, and the furnaces will be generally overhauled. They now turn out about 80 tons per day. Alabama Furnace, on the Selma, Rome & Dalton road, will soon be transferred to Nobles & Ware, of Anniston. The furnace will be greatly improved and its daily yield will be increased to 50 tons.—*Chattanooga Tradesman.*

Bradley & Co., at Syracuse, N. Y., have completed an addition to their works 80 by 175 ft. and four stories high. They are making a large number of the Bradley cushioned hammers. They now employ 200 men and are running overtime.

There are now 14 blast furnaces running in the Mahoning Valley in Ohio, making about 850 tons of pig-iron a day.

The consolidation of the Southern States Coal, Iron & Land Co. with the Tennessee Coal, Iron & Railroad Co. was completed at Nashville last week. The works at South Pittsburgh are to be kept in full operation, and a second furnace will be built at Cowan.

The Rail Market.

Steel rails are quiet, and quotations continue at $58 to $60 per ton at mills, with some transactions at $61. Nothing is doing in foreign rails.

Iron rails are dull, with no large transactions reported. Quotations continue at $48 to $48.50 per ton at mill for heavy sections and $50 to $53 for light rails.

Spikes are firm at $3.15 to $3.25 per 100 lbs., with a demand for all that can be produced. Fish-plates continue at $2.60 per 100 lbs.; track-bolts, $3.75 to $4.25.

Old iron rails have suddenly become very active, and sales are reported in Philadelphia as high as $30.50 to $32.50 per ton for tees and $33.50 to $34 for double-heads. The stock on hand is very light.

British Rail Exports.

The British Board reports as follows the exports of iron and steel rails to the United States and to all countries for the month of December and for the twelve months then ending, for the last three years, in tons of 2,240 lbs.:

	December.			Twelve months.		
To United States:	1879.	1880.	1881.	1879.	1880.	1881.
Iron	3,504	10,651	3,467	20,955	97,863	96,339
Steel	3,376	2,995	13,242	23,681	120,655	195,293
Total	6,880	13,646	16,709	44,636	218,518	291,632
To all countries:						
Iron	7,132	12,694	4,421	55,071	144,903	119,686
Steel	20,656	21,284	46,897	332,145	459,187	594,419
Total	27,788	33,978	51,318	387,216	604,090	714,105

In December the exports of iron to this country in 1881 were but one-third what they were in 1880, but the exports of steel were more than four times as great, and in the total there was an increase of 22½ per cent.

For the whole year the exports of iron to the United States in 1881 were 1⅛ per cent. less than in 1880, but 361 per cent. more than in 1879; and the exports of steel were 62 per cent. more than in 1880, and 725 per cent. more than in 1879.

The monthly exports to the United States for two years have been:

	1881.			1880.		
	Steel.	Iron.	Total.	Steel.	Iron.	Total.
January	1,705	5,666	7,368	7,350	7,941	15,291
February	4,380	10,419	14,799	6,162	6,608	12,770
March	14,891	10,829	25,720	4,010	10,518	14,528
April	28,050	10,352	38,402	7,075	13,727	20,802
May	22,628	17,206	39,844	22,968	6,305	29,273
June	21,082	10,616	31,698	16,342	17,572	33,914
July	20,096	6,728	26,824	7,054	7,785	14,829
August	23,820	5,763	29,583	11,853	4,419	16,272
September	20,111	5,922	26,033	10,052	3,880	13,932
October	14,327	4,981	19,308	14,092	3,573	17,665
November	10,951	4,393	15,344	10,702	4,884	15,586
December	13,242	3,467	16,709	2,995	10,651	13,646
Year	195,293	96,339	291,632	120,655	97,863	218,518

The largest exports in 1881 were in May, since which

time there has been a great falling off, due to the fact, probably, that rails are not much wanted in winter. Steel formed 67 per cent. of the exports in 1881, 59 per cent. in 1880 and 53 per cent. in 1879.

Keeping a Sharp Lookout.

The Utica (N. Y.) *Herald* says: "Railroad men are taking no chances now-a-days. When the new Fontaine locomotive was making the trial trip on the Central last week on the special west, it lost time. To guard against accidents, No. 600, Engineer Rube Allen, trailed behind the train to pick it up if necessary. Owing to a delay near Green's Corners, Conductor Toner sent Brakeman George Ellis back to flag No. 600. Another delay occurred at Chittenango, and Brakeman Pierce was dropped off. Still another delay occurred near Manlius, and having no other flag or brakeman, Conductor Toner requested drawing-room Conductor Murray to go back, and he complied like a man."

Pennsylvania Railroad Examinations for Color-Blindness.

The examination of the employés of the Pennsylvania Railroad for color-blindness is now in progress. About 2,000 men have been examined so far, and it is stated that of this number 55 have been found absolutely color-blind and 246 defective in vision to a less extent. A second examination, it is said, showed 13 who entirely failed to recognize colored flags and lanterns in practice.

The regulations for the examination were prepared by a special committee of officers of the road with Dr. William Thompson, of Jefferson College. The instructions as issued by General Manager Thomson give the apparatus to be used as follows: A card containing letters of graded sizes for testing distance sight; a frame for supporting print to be read, with a graduated rod attached for measuring distance from the eye while reading; a spectacle frame for obstructing the vision of either eye while testing the other; a watch with a loud tick for testing the hearing, and an assortment of colored yarns for testing the sense of color. This last consists of a frame containing 40 tints of red, green and rose colors. Persons will be required to select a given color when it is named to match a test skein handed to them, and to undergo an examination on this point which will calculate their color senses to a nicety.

Forged Tickets.

Several railroads running out of Chicago have been painfully aware for a time past of the fact that counterfeit tickets and passes have been in circulation, and so cleverly was the work done that till within a few days they have been utterly unable to locate the forgers. Tickets good to a certain date have been extended, fraudulently, of course, as well as the dates changed, sometimes months, and not unfrequently a whole year, the "1881" being changed to "1882." Detectives were employed to ferret out the operators, but for a time they were baffled, and though conductors were thoroughly posted on the subject, and kept a good look out, nothing resulted till the early part of the week, when a man was arrested on the Northwestern Railroad for using a forged ticket from Chicago to Milwaukee. The fellow did not appear to know that the ticket was not good, and said he bought it of a Clark street scalper. About the same time another party was caught using a pass between Chicago and Milwaukee, on which the time had been extended. The result of these captures was that, armed with search warrants, Detectives La Bounty and Haas made visits to a couple of scalpers' offices. In Lincoln's, at No. 81 South Clark street, they found 22 annual passes and one counterfeit ticket, the latter on the Northwestern Railroad. The passes had been issued by the Grand Trunk, Chicago & Alton, Northwestern, and other roads, and generally were for 1881, the latter figure being changed to 2. Lincoln claimed that he bought them legitimately, and did not sell them, but he was nevertheless brought before Justice Kaufmann, who discharged him because there was no prosecution. The railroad companies got their property, but why they should not wish to punish Lincoln for his part in the circulation of the bogus tickets and altered passes does not appear, unless he gave the officials some interesting information as to where the tickets and passes came from.—*Chicago Inter-Ocean, Jan.* 26.

Some other arrests have since been made.

The Fontaine Locomotive.

The London *Engineer* of Jan. 13 publishes an engraving of this engine, copied from an American paper, and for which due credit is not given, a neglect of which that paper is often guilty. It comments on the engine as follows:

"We need scarcely add that it is a mechanical absurdity, but all the more interesting for that reason. It shows what blunders even clever engineers can make when they are ignorant of the fundamental principles of dynamics."

Mexican English.

The many American engineers employed on the new railroads in Mexico find ignorance of the language of the country an obstacle in the way of conducting negotiations. But once in a while they stumble upon a Mexican who has studied English. How much this facilitates matters may be judged by the following summary of the conditions of renting a building to one of the companies, written by one of these English-writing Mexicans:

"I. The house owe to be dislodge immediately by the people that has coming after the first.

"II. I don't consent the kitchen any more in the house.

"III. Eether horses nor pastures nor any(th) trade of wagons in side.

"IV. When the engineers allow any person or guest owe to be with agreement.

"V. If any fellow of company should do any thing that would put my house in danger I will put him out directly.

"VI. I will do the same with any person that should not proceed well in the same idea.

"VII. It is not probably that I need my house very soon, but if I shall need it you will let me have it immediately.

"VIII. Therefore I shall not require to take out the timber nor any other materials belonging to the company untill she has theire own house, where she put them on, for theire expenses should be good deal to transport them to another part. I do not wish any damage for the company while it be possible to avoid it."

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—A dispatch from Boston, Jan. 31, says: "The Atchison, Topeka & Santa Fe directors had a meeting yesterday, at which, it is understood, the changed situation brought by the acquisition of the St. Louis and San Francisco by the Gould and Huntington interest was considered. No action was taken, and they are to meet again on Wednesday. Whether the carrying out of the agreements entered into by the San Francisco, the Atchison, and the Atlantic & Pacific in the building of the latter road as an independent line to the coast will be insisted upon is still an open question. The President of the Atchison is quoted as asserting that the new control of the San Francisco will not prove injurious to the Atchison system, and that the relations with Gould and the Southern Pacific people will be harmonious. Many of the prominent stockholders express a similar view. They say that the Atchison's position is in reality strengthened by the coming in of another interest in the building of the Atlantic and Pacific to a point where it can be joined with the Southern Pacific; that a union with the latter at Mohave has many advantages, while it is a matter of indifference to the Atchison who controls the San Francisco road. Gould's operation, they say, was not to antagonize the interests of the Atchison at all, but to protect his own interests, threatened by the projected extension of the San Francisco road into the territory Gould is desirous of controlling, while the Huntington move, it was plainly to be seen, was simply to check the progress of a competition to the Southern Pacific enterprise. The move, they say, more seriously concerns the San Francisco road, by the check it puts upon its extension, and the Little Rock & Fort Smith.

"Meanwhile the Mexican enterprises to be connected with the great Atchison system are going energetically forward. The latest reports from the Mexican Central work are that it is going ahead at the rate of a mile and a half of completed road daily. On Jan. 23, the date of the latest reports, it had been built 51 miles south from Paso del Norte; from the City of Mexico north 118⅔ miles of the road are already in operation, and the track is laid 15 miles further on. Along the Sonora road, by Jan. 13, the date of the last report from this enterprise, the track is laid 23 miles north of Hermosillo toward the boundary line. On this road also a mile and a half of completed road a day is building. At that date the track had been finished 116 miles from Guaymas, and that portion of the road from Guaymas to Hermosillo is now in operation, with a large and increasing traffic. Jose M. Ortis, a brother of the present Governor of Sonora, is in Boston, arranging for direct trade between the city and Sonora."

Bangor & Calais Shore Line.—This old project for a railroad from Bangor, Me., eastward to Calais on the St. Croix, passing through the towns along the coast, has been revived. A proposition to build the road has been made by Col Greene, who has just finished the Grand Southern road from St. Stephen, N. B., opposite Calais, to St. John. A convention of delegates from the shore towns was held in Cherryfield last week and voted in favor of accepting the proposition, which calls for subscriptions from the towns on the line.

Boston & Albany.—The Railroad Committee of the Massachusetts Legislature is considering a bill to sell the stock in this company now owned by the state to the company at 160, payment to be made in 5 per cent. bonds at par. This is in accordance with the proposition said to have the company's approval.

Boston, Hoosac Tunnel & Western.—The Boston *Journal* of Jan. 28 says: "We stated a few days since that it was very probable that new parties would take hold of this road in place of the Continental Construction Company, which has not carried on the work of construction as rapidly as the best interests of the railway seemed to demand. Yesterday Gen. Burt, the President of the Boston, Hoosac Tunnel & Western Railway, made arrangements in New York whereby the contract with the Continental Construction Company was canceled. The new contractors, who are foreign parties of large experience in handling large enterprises and who are backed by great wealth, have already made contracts for the extension of the railway from Schenectady to Buffalo with its several branches, and will commence operations Feb. 1 upon an extensive scale. An idea of the magnitude of the contract which Gen. Burt has made for new construction may be arrived at when it is considered that it calls for the completion of a second track upon the main line already completed, from the Massachusetts state line to Schenectady, a distance of 65 miles, constructing the Troy Branch, 10 miles; Mechanicsville to Saratoga Springs, 18 miles, and the Schuylerville Branch, 8 miles. A portion of the last two mentioned branches has already been constructed and put in operation. West of Schenectady the new contract calls for the building of 75 miles of double-track road to Utica, and also from Utica to a connection with the Syracuse & Chenango Railroad at Manlius, near Syracuse. All the work mentioned above is to be completed before the close of the present year. And within two years, the Syracuse & Buffalo Extension, 144 miles in length, of double track; the Syracuse & Oswego Branch of 44½ miles, and the Rochester Branch of 17 miles, are to be completed. These different sections are to be finished in a first-class manner, with all the latest improvements in railroads that experience has proved to be advisable to adopt. The equipment of the road will also comprise the best that can be obtained, and large enough to enable the railway to rank from the first as one of the great trunk lines of the country. And in this connection it is quite likely that we shall soon be able to announce important movements in regard to the expansion of the road."

California Southern.—The California Southern Extension Company has been consolidated with this company. The road covered by the articles of the original company was from San Diego Bay, Cal., to San Bernardino, 116 miles; the Extension Company was to build from San Bernardino to a junction with the Atlantic & Pacific, 60 miles. The authorized capital stock of the consolidated company is $4,400,000.

Camden & Atlantic.—This company has decided to abandon the May's Landing Branch, and the rails will be taken up. It is seven miles long, from Egg Harbor to May's Landing, and has never earned its expenses. Since the West Jersey & Atlantic road was built, passing directly through May's Landing, the business of the branch has been almost nothing, while a heavy expense was required for repairs.

Canadian Pacific.—A dispatch from Winnipeg, Manitoba, Jan. 26, says: "The syndicate having abandoned the Yellow Head Pass for the route of the Canadian Pacific Railroad through the Rocky Mountains, have now to determine between four passes lying between it and the international boundary, the most southern being Kananaskis Pass, leading across the mountains to near the head of the Columbia River, which thence flows northward along the western base of the mountains until in latitude 52 degrees it bursts through the Selkirk Range and turns southward on its course into American territory, north of Kananaskis. Within direct distance of 100 miles are three other passes, Vermillion, Kicking Horse Pass and Howse, all commencing in the valley of the Bow River or some of its tributaries, and debouching in the deep ravine of the Columbia.

"Major Rogers, who had superintendence of the whole survey in the Rockies and traversed route from the Pacific to the scene, claims to have discovered a practicable crossing over the Selkirk Plateau by following the ravines of two creeks, one flowing easterly into the Columbia and the other westerly into the same river. This pass through the Selkirk Range starts within 10 miles from the western termini of Howse and Kicking Horse passes. It is in almost a direct line with Kicking Horse Pass and the proposed route by the South Branch of Thompson to Kamloop."

Central & Montgomery.—It is stated that this road has been sold to the Gulf, Colorado & Santa Fe Company. It runs from Navasota, Tex., on the Houston, Texas & Central road, southwest 28 miles to Montgomery. It will be extended from that place to Brenham to connect with the Santa Fe road.

Central, of New Jersey.—In Newark, N. J., Feb. 1, application having been made to the Court of Chancery for the delivery to the Central Railroad Company, of New Jersey, of the property now in the hands of Receiver F. S. Lathrop, and the Receiver having filed an answer admitting the solvency of the company and his willingness and readiness to pay over all the assets of the company in his hands, and asking an examination of his accounts, and a discharge from the receivership, Chancellor Runyon made an order referring the matter to a Master of Chancery to make the examination referred to and report to him. The probability is that the road will be taken out of the hands of the Receiver in a few days.

—The contract for the grading and masonry of the second track on the Long Branch Division, from Elizabethport to Long Branch, has been let to Coleman Brothers, of New York. The contract for the bridges has been let to Meeker & Hedden, of Newark, N. J.

Central Vermont.—A dispatch to the Boston *Journal* from Burlington, Vt., says: "An examination of Judge Wheeler's opinions filed in the Clerk's office of the United States Court at Burlington in the several railroad cases pending against the Central Vermont and others, shows that the statement made that the United States Court had taken jurisdiction in these cases was incorrect. Your correspondent finds that the Court in two cases has simply overruled the demurrers, on the ground that the plea rests on the simple statement of counsel without verification by oath so as to establish the facts claimed to exist, and that the Court refuses to accept such statements as proven facts. In the Dwight case, which is the principal one, Judge Wheeler says, as before stated and shown, the parties to this suit are citizens of different states, and the suit is one of which this court has jurisdiction for that reason, providing, however, that the orators can make out the case presented by their bill, including the refusal of the Vermont & Canada directors to prosecute as a part of their case. If they cannot do this they have no case. That part of the case, as before shown, has not been denied in the necessary manner by answer to be effective to defeat the case upon that point. Judge Wheeler further says there is nothing before the Court now on which the Court is authorized to act under the provisions of that statute (act of Congress.) The pleas and demurrers are therefore overruled, and the defendants (the Central Vermont) are required to answer by the first day of next term, as stated in a previous dispatch, but the question of jurisdiction is left undecided until the answer and proof are made. In the case of Dwight against J. Gregory Smith and others, the demurrer is sustained, and the case of Webb against Smith and the Central Vermont, the demurrers are also sustained. Judge Wheeler holds, in the demurrers which he has overruled, that the questions at issue must be determined by answer and proof, and not by demurrer. Upon this answer and proof depends the question of whether the United States Court will take jurisdiction in this case."

Chesapeake & Ohio.—Argument is in progress this week before the West Virginia Court of Appeals on this company's claim to exemption from taxes in that state. The claim is based upon the fact that the company is successor to the Covington & Ohio, and the charter of that company provided that its property should be exempt from taxation until the profits in one year should be equal to 10 per cent. on the capital stock. The state claims that the exemption does not extend to the present company.

Chicago, Burlington & Quincy.—On the morning of Jan. 24 a fire broke out in the car shed at Aurora, Ill., and spread very rapidly, burning up the directors' car, a dining car, six other passenger cars and several caboose and freight cars. A large pile of seasoned black walnut lumber was also destroyed. The loss is estimated at $65,000.

Track on the Denver Extension of the Burlington & Missouri River line in Nebraska is now reported laid for 135 miles west of Culbertson, the late terminus, about 25 miles having been laid since the close of the year.

Chicago & Grand Trunk.—It has been decided to remove the repair shops from Port Huron to Battle Creek, Mich., that town giving a bonus of $25,000 and 25 acres of land to secure the location there.

Chicago, Milwaukee & St. Paul.—The suit of this company against the Sioux City & St. Paul Railroad Company and others asserting title to certain lands in Osceola, Dickinson and O'Brien counties, Iowa, involving $1,000,000, was decided in the Circuit Court of the United States, Judge Love rendering the opinion and Judge McCrary concurring. After making a concise statement of the case at issue Judge Love recited the reasons why the government made the grant and for what purpose, viz., that it was evident that Congress gave the lands in aid of a project to connect the Mississippi River at McGregor with the Missouri River at Sioux City by means of these two roads, one some 250 miles in length, running from the east to the west, the other only about 60 miles long, running in a different direction. There was to be a junction of these roads in O'Brien County. Without this intersection there would have been a failure to connect the two rivers, which was beyond a question one of the principal objects of the enterprise. If no road had been completed but the short line from the state line to Sioux City all the chief purposes of the grantor would have been to a great extent defeated. He could, therefore, arrive at no conclusion other than that it was the intention of Congress to divide the lands at the point of intersection between the two enterprises. There could have been no reason for giving all the lands at the point of junction to one or the other enterprise. The intent of Congress was to give the lands under no other conditions than upon the construction of the roads according to the terms of the act and the legislative act of the trustee.

The judge gives the obligations imposed upon the other parties to the grant, and says that the mere establishment of the definite line of their roads is not sufficient to give them title. The company must perform its contract with the trustee by construction of the work according to the law of the state granting the lands for that purpose. Both complainant and respondent in this case have complied with this law. The complainant company now claims one-half the lands lying within the over-lapping limits. The respondent resists this claim, and seeks to exclude the complainant entirely from the lands. The judge then gives the law and equity in dispute, showing that complainant is entitled to the moiety of the lands claimed, and that it was the evident intention of the grantor that the lands were to be divided between the two roads, and that priority of establishment did not give one road title to all. Judge Lee says that a decision of Secretary of the Interior Delano in favor of the respondent's claim to exclusive right

to the lands proceeded upon the sole ground of priority of location and construction, and says:

"This was manifestly erroneous in point of law, and it cannot be admitted to exclude the complainant company from its equal rights to lands earned by it in compliance with conditions imposed by the legislative will of the trustee and the act of Congress."

Chicago, Pekin & Southwestern.—Receiver Reed reports to the Court for November and December as follows:

Balance, Nov. 1		$8,027
Receipts for November		36,268
" " December		41,163
Total		$85,458
Disbursements in November	$36,788	
" " December	39,199	
		75,987
Balance, Jan. 1		$9,471

The disbursements included $6,707 for new steel rails and $12,000 for new cars.

Chicago, Portage & Superior.—The recent transfer of this company and the sudden stoppage of work on the line caused much local excitement, and there was some rioting among the discharged workmen.

It is now reported that the purchase of the stock by Mr. Cable was for account of the Chicago, Rock Island & Pacific Company, with the view of making a line to the north for that company.

A dispatch from Chicago, Jan. 31, says: "Mr. R. R. Cable, of the Chicago, Rock Island & Pacific Railroad, is authority for the statement that the transfer of the Portage & Superior Railroad to the Chicago, St. Paul, Minneapolis & Omaha and the Chicago, Rock Island & Pacific roads is so nearly agreed upon as to be, practically, an accomplished fact. The latter roads are to assume the payment of the men and settle all indebtedness. It is stated on undoubted authority that the Rock Island road has nearly completed arrangements to use the Chicago, St. Paul, Minneapolis & Omaha as a feeder to the northern pineries, and to build a line from there to a point in Illinois, which shall tap the Rock Island road and make a complete triangular connection between Omaha, Chicago & St. Paul."

Chicago & Western Indiana.—The branches of this road built by nominally separate companies have been consolidated with the main company. The companies thus taken in are the South Chicago & Western Indiana and the Chicago & Western Indiana Belt. The name of the consolidated company remains the Chicago & Western Indiana; its capital stock is fixed at $5,000,000 and the bonded debt limited to $10,000,000. The office is in Chicago

Chicago & West Michigan.—The Boston *Advertiser* says: "The late earnings of the Chicago & West Michigan Railroad Company cannot well be tabulated. During the first nine months of the year 1881 the gross earnings were $774,282, as compared with $609,414 in 1880. The larger part of this gain was made during the three months preceding October, when the increase of earnings from the opening of new enterprises along the line of the road swelled from 14 to 40 and 50 per cent. In October, 105 new miles of road were put into the system, since which time the earnings of the company, as compared with the 1880 earnings, have shown an increase of about 65 per cent. The October earnings were $126,636, as compared with $78,993 upon the West Michigan road in October, 1880, or with $101,231, the sum of the gross earnings of the West Michigan and the branches since consolidated with it; a gain of 60 per cent. when the increase of mileage is not taken into account, or of 25 per cent. with the same mileage. The November earnings were in 1881 $118,420, as compared with earnings of $72,467 upon the West Michigan road in November, 1880, or of $93,374 upon the same mileage in November, 1880."

Cincinnati, Indianapolis, St. Louis & Chicago.—This company last week began to run trains over the new Kankakee & Seneca road, which extends its line from Kankakee, Ill., to a junction with the Rock Island road at Seneca. One train a day is run at present, but the number will soon be increased

Columbia & Greenville.—This company makes the following statement for the quarter ending Dec. 31:

Gross earnings	$261,699.20
Expenses	159,609.49
Net earnings	$102,089.71
Interest and rentals	57,500.00
Surplus	$44,589.71

The surplus is equivalent to 2.23 per cent. on the stock for the quarter.

Delaware Western.—Work will shortly be begun on the extension of this road, in accordance with the act authorizing it, which requires a beginning to be made before March 1.

East Tennessee, Virginia & Georgia.—Work on the line from Atlanta, Ga., to Rome has been suspended in and near Atlanta, in consequence of action taken by the City Council which may make a change in the line necessary.

Fitchburg.—At the annual meeting in Boston, Jan. 31, the stockholders voted to authorize the issue of $500,000 additional bonds for the purpose of funding the floating debt; also to approve the change of the tracks at Belmont and the lease of the old location to the Massachusetts Central.

Galveston, Harrisburg & San Antonio.—Trains on the El Paso Division (which is built and operated by the Southern Pacific Company) now run to Marfa, Tex., which is 195 miles east from El Paso and 91½ miles east of Sierra Blanca, the junction with the Texas & Pacific. The latest time-table shows an express and a freight and emigrant train each way daily between El Paso and Marfa, besides two Texas & Pacific trains each way daily between El Paso and Sierra Blanca. Marfa is 1,480.6 miles from San Francisco by the railroad.

Greenwood, Laurens & Spartanburg.—Work is to be begun next week on this road at Greenwood, S. C. A force of convicts has been hired from the state and teams and tools secured.

Knox & Lincoln.—The Maine Central Company has made a final offer to lease this road, which will be submitted to the stockholders. The rental offered is said to be $60,000 a year for 20 years and $72,000 a year thereafter.

Lebanon Springs.—The Receiver's report shows receipts for the quarter ending Dec. 31 (including a balance of $8,701) of $80,660, and disbursements of $68,614. The earnings during the same period were $23,661. The assets amount to $320,876, and the liabilities to $312,203, the latter including $293,111 in Receiver's certificates.

Lower California & Sonora.—The concession for this road, granted to Mr. Thomas L. Rogers, Vice-President of the California Southern, provides for a railroad to start at Tia Juana, 15 miles from San Diego, Cal., on the Mexican frontier, running thence past Punta Ysabel, and thence to a point not yet determined on the line of the Sonora Railway; also, another branch to Real del Castillo and Todos Santos.

The company is obliged to begin surveys inside of four months from the date of this contract, and to build the entire road in seven years, the work to be divided as follows: Work must begin during the first year; in the second, at least 20 miles must be built; in the third, 50 miles and in each following year 75 miles. The government grants a right of way over its own lands, a width of about 230 ft. Construction material entering the country will be free from duty, and the exemption continues for 25 years. The road itself and all its appurtenances, as also its capital, will be exempt from taxation for 50 years. The company will also have the right to join any other railways already built or that may be built.

Maine Central.—This company has been considering for some time the question of building new shops, the old ones at Waterville being insufficient for the work to be done. It is now stated that the company has accepted a proposition made by the city of Portland to sell a tract of land as a site for the shops at a nominal price. It is understood that the principal shops will be established in Portland, though the Waterville shops will probably be kept up also.

Manitoba Southwestern.—At the annual meeting in Winnipeg, Feb. 1, there was a fight which ended in the choice of two sets of officers, one by the American or Northern Pacific party and the other by the Canadian stockholders.

Middletown & Crawford.—This road has been leased to the New York, Lake Erie & Western Company for 99 years, at a rental equivalent to the interest on the bonds and 4 per cent. on the stock. It extends from Crawford Junction, N. Y., to Pine Bush, 10 miles, its trains running over three miles of the New York, Ontario & Western track from Crawford Junction to Middletown.

Missouri Pacific.—Track on the Jefferson City, Lebanon & Southwestern Branch is now laid to Little Gravois, Mo., 40 miles southwest from Jefferson City and 14 miles beyond the point reported at the close of the year. Work is progressing rapidly.

New Bonds.—New issues of bonds are offered on the market as follows:

Long Island consolidated 5 per cent. bonds are offered by the Corbin Banking Company, James G. King's Sons and Maxwell & Graves, of New York, at par and interest. The total issue is $5,000,000, of which $2,500,000 are to be sold now to pay off old bonds, floating debt, etc., and for improvements and new equipment; $1,700,000 are reserved to provide for the old first and second-mortgage bonds, and $800,000 reserved to be used as needed in the future.

New York Central & Hudson River.—An investigation into the Spuyten Duyvil accident is in progress by a special committee of the New York Senate.

The Grand Jury in New York has found indictments for manslaughter against the conductor and rear brakeman of the wrecked express train. A general presentment will probably also be made.

New York, Lake Erie & Western.—This company has added to its leased lines the Middletown & Crawford road, from Middletown, N. Y., to Pine Bush, 13 miles, as noted elsewhere. It is valuable to the Erie chiefly for its milk business.

It is stated that arrangements have been completed finally for the exchange of traffic between the Erie and the Pennsylvania Company, Cincinnati business to go over the Little Miami road from Springfield, O., Chicago and Indianapolis business over the Columbus, Chicago & Indiana Central from Urbana.

New York & New England.—This company has petitioned the Massachusetts Legislature for an act authorizing it to extend the Woonsocket Division of its road from some point in Brookline or Newton to Boston, over the right of way of the Boston & Albany Railroad Company, or otherwise; to extend the Southbridge Branch of its road from Southbridge to some convenient point on the line of the Massachusetts Central Railroad; to extend the Ridge Hill Branch of its road from its terminus in Needham through Wellesley and Natick to Framingham; to do all things necessary for the constructien of the above-named extensions; to take land along the line of its present location for additional tracks and depot grounds.

New York, New Haven & Hartford.—This company has decided to ballast the entire main line with broken stone as fast as possible. Some other improvements are to be made by cutting down grades and straightening tracks at several points between New Haven and Williamsbridge.

Norfolk & Western.—It has been decided to extend the New River road, which this company is now building, south of its own line from New River station through Floyd, Carroll and Grayson counties in Virginia to the North Carolina line. The distance is about 50 miles. The section now under construction is north of the Norfolk & Western.

Northern Pacific.—Negotiations are reported to be in progress between this company and the Union Pacific for an agreement as to a division of the Montana business. It is said that the chief point in discussion is the line from Helena to Butte, which both companies purpose building. The Utah & Northern, the Union Pacific line, is already completed to Butte and is making preparations for an immediate extension to Helena.

Ohio.—It is reported that negotiations have been concluded for the transfer of the Cincinnati, Richmond & Chicago road to the Pennsylvania Company, in exchange for that company's half interest in the Indianapolis & St. Louis road. The agreement cannot be concluded, however, until the question of the legality of the consolidation forming this company is decided.

Oley Valley.—Surveys have been completed for this road, which is to run from Birdsboro, Pa., on the Philadelphia & Reading road, through the Oley Valley to Siesholtzville, about 24 miles. Contracts for the grading will be let early in the spring.

Painesville & Youngstown.—This company made default in interest Jan. 1 and several suits have been begun against it. On application of the President of the company the Court of Common Pleas of Lake County, O., last week appointed a receiver, who at once took possession. It is understood that the suits will be pressed, and the road sold and reorganized as soon as possible.

Pennsylvania.—Grading is now in progress on this company's Susquehanna & Clearfield Branch from the Philadelphia & Erie Division at the mouth of Sinnemahoning up the West Branch of the Susquehanna to Karthaus, a distance of 22 miles. It is to be extended from Karthaus to the mouth of Moshannon and up the Moshannon to a connection with the Moshannon Branch. The new line will reach a considerable coal district, and can also be used as an outlet for a large part of the Clearfield coal region with much lighter grades than the line to Tyrone now in use.

Surveys have been made for a branch from Wayne, Pa., to Conshohocken. The line crosses a number of highways and the Reading Railroad track above grade.

The company recently forbid the use by the Cambria Iron Company of a part of the grade of the old Portage road near Johnstown, and required rails which had been laid there to be taken up. It is said that the reason for this action is that the track laid might be used to make connection with the Somerset & Cambria Branch of the Baltimore & Ohio.

Philadelphia & Reading.—Surveys have been begun for a cross branch from Shamokin, Pa., to Danville, about 15 miles. This branch is evidently intended to shorten the distance for coal shipped Westward from a considerable part of the Reading's territory, and is a preliminary to the new Western connection by way of Williamsport.

Port Huron & Northwestern.—The track of the East Saginaw Branch of this road is now completed to East Saginaw, Mich., 46 miles westward from the old terminus at Marlette and 91 miles from Port Huron. The company now has 149 miles of road, the main line from Port Huron to Sand Beach, 70 miles, and the branch from Marlette Junction to East Saginaw, 79 miles.

Pullman's Palace Car Co.—At the special meeting in Chicago, Feb. 1, resolutions were adopted to increase the capital stock of the company by the issue of new stock to the extent of $2,523,600, being 25 per cent. of the entire capital stock, the money to be used for purposes heretofore announced. All the stockholders are to have until March 1 to subscribe for the new stock at par to an extent not exceeding one-fourth of their holdings on Feb. 18, 1882. All the stock not subscribed for may be disposed of by the directors. Payment of 50 per cent. is to be made on or before March 1, and the remainder on or before May 2.

Richmond & Louisville.—This company was organized at a meeting held in Alexandria, Va., Jan. 30. Another meeting will be held Feb. 15, to make arrangements for beginning work on the projected line.

St. Louis, Iron Mountain & Southern.—Track on the Arkansas Branch is now laid from the main line at Knobel, Ark., southward to Gainsville, 10 miles. Work is progressing steadily.

St. Louis, Jerseyville & Springfield.—This road is now completed to Jersey Landing, Ill., three miles beyond the late terminus at Grafton and 71 miles from its junction with the Wabash, St. Louis & Pacific at Bates. The road is to be worked by the Wabash.

St. Louis & Lake Erie.—This company has filed articles of incorporation to build a railroad from East St. Louis to a point on the Indianapolis, Decatur & Springfield road, in Macon County, Ill. This is the proposed extension of the Indiana, Bloomington & Western to St. Louis.

Sussex Midland.—An organization under this charter was completed by the local stockholders at a meeting held in Bridgeville, Del., last week. New York parties have made an offer to build the road, but the local corporators refuse to allow them to organize the company, because they had given no guarantees as to their ability to carry out their contracts.

Tennessee Coal, Iron & Railroad Co.—The consolidation of the Southern States Coal, Iron & Land Company with this company was completed at a meeting held in Nashville, Tenn., Jan. 26. The capital stock of the consolidated company was fixed at $3,000,000. Some extensions of the company's railroad to reach new mines are to be made shortly.

Tionesta & Allegheny Valley.—This company has been organized to build a railroad from Oil City, Pa., to Sheffield in Warren County, a distance of 58 miles. The capital stock is to be $580,000.

Ulster & Delaware.—An effort is being made to secure the extension of this road from its present terminus at Stamford, N. Y., to Cooperstown, a distance of 23 miles.

Union Pacific.—Notice is given the 66 collateral trust mortgage bonds have been drawn for redemption under the terms of the mortgage, the numbers drawn being as follows: 157, 178, 202, 287, 360, 388, 546, 713, 900, 997, 1053, 1081, 1091, 1103, 1163, 1229, 1226, 1337, 1379, 1436, 1467, 1562, 1563, 1581, 1681, 1703, 1711, 1941, 1979, 2233, 2262, 2318, 2327, 2377, 2593, 2797, 2830, 2971, 3042, 3088, 3094, 3302, 3332, 3368, 3374, 3391, 3658, 3690, 3707, 3806, 3822, 3890, 3913, 3941, 3954, 4007, 4012, 4164, 4253, 4300, 4325, 4410, 4525, 4530, 4564 and 5241. These bonds will be redeemed by the Union Trust Company of New York, Trustee, on Feb. 4 next, at 105 and accrued interest. Interest will cease from that date.

Wabash, St. Louis & Pacific.—It is reported that work will soon be begun on the extension of the Quincy, Missouri & Pacific Division from Trenton, Mo., to St. Joseph.

Western North Carolina.—Track on this road is now completed to Paint Rock, on the Tennessee line, 180 miles from Salisbury. This is the terminus of this branch and the point of junction with the East Tennessee, Virginia & Georgia road. The telegraphic report of the completion of the road some weeks ago was premature.

On the Ducktown Branch the track is laid to Pigeon River, 22 miles from Asheville. Both branches are finished within the extended limit of time fixed by the State Commissioners. Work will be continued on the Ducktown Branch, contracts having been let for some distance.

Wm. D. Carter, of Asheville, has begun suit in the United States Circuit Court to set aside the decrees of foreclosure under which this road was sold to the State of North Carolina. He claims possession of the road under a sheriff's sale made in 1876.

Woodstown & Swedesboro.—This company has been organized to build a railroad from Swedesboro, N. J., the end of a branch of the West Jersey road, south to Woodstown, about eight miles. The intention is to extend the road about six miles beyond Woodstown to a junction with the Salem road. The company is controlled by the West Jersey.

Xenia & Maysville.—It is proposed to build a narrow-gauge road from Xenia, O., southeast to Hillsboro, to connect with the Columbus & Maysville road. The distance is about 40 miles.

Yadkin Valley & Virginia.—It is proposed to build a railroad from Salisbury, N. C., northward into the Yadkin Valley and following that river to East Bend, and thence by Danbury to the Virginia line and to a connection with the Danville & New River road. The project is based upon the assumption that the Virginia Midland has finally abandoned its North Carolina Extension.

Zanesville & Ohio River.—It is proposed to build a railroad from Zanesville, O., southeastward down the Muskingum Valley to the Ohio. Both Marietta and Belpre are proposed as terminal points on the Ohio.